POULTRY KEEPING

C. A. FLATT

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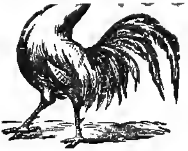

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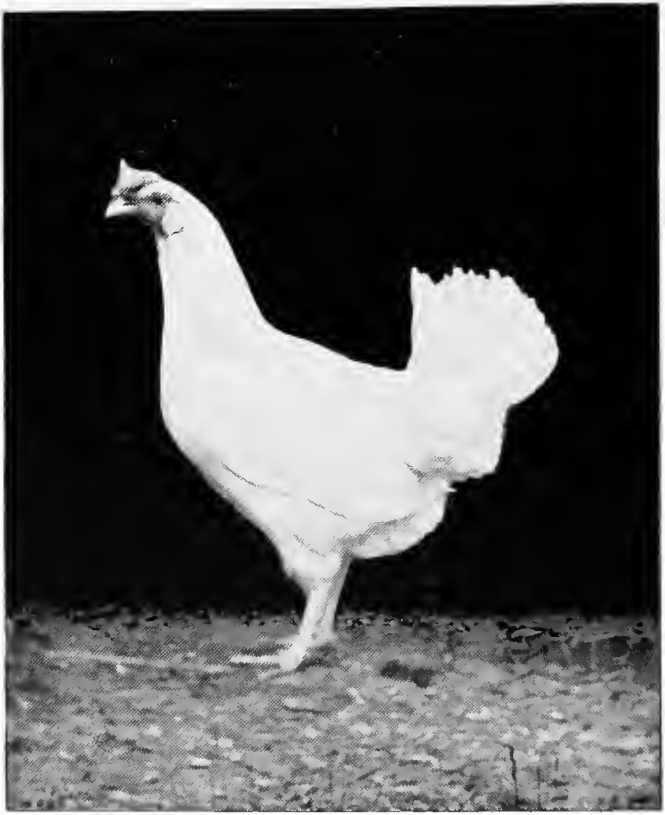

A TYPICAL UTILITY WHITE LEGHORN PULLET

POSSESSING ALL THE POINTS OF A LAYER AND THE NECESSARY VIGOUR FOR USE IN THE BREEDING PEN

POULTRY-KEEPING

FOR THE SMALL POULTRY-KEEPER AND GENERAL FARMER

BY

C. A. FLATT

LATE INSTRUCTOR IN POULTRY-KEEPING TO THE DEVON COUNTY COUNCIL

WITH FORTY-FOUR ILLUSTRATIONS

METHUEN & CO. LTD.
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PREFACE

MY object in the following pages has been to treat the subject of utility poultry production in as concise and general a manner as possible, mainly for beginners and those to whom poultry-keeping is only of partial importance in their daily work, or a profitable pursuit in leisure time. But as the book summarizes the results of twenty years' practical experience, it may also be of interest to the specialist.

Those who wish for further information on poultry feeding are referred to " Poultry Foods and Feeding," by Duncan Forbes Laurie. Chicken rearing and poultry fattening, respectively, are dealt with exhaustively in F. G. Paynter's " Paynter's System of Poultry Rearing," and J W. Hurst's " How to Fatten Poultry."

Emphasis is laid on the desirability of managing farm poultry in a systematic manner, and a suitable plan is outlined. Hints are also given as to increasing the egg production of small pens kept by ordinary householders.

Much good work, deserving every encouragement, is being done by County authorities, and the numerous Poultry Clubs and Societies.

To the many friends made in the course of a long experience my thanks are tendered for information so freely given from time to time.

My thanks are especially due to my former colleague, Mr. H. B. Tilley, B.Sc. Agri., for valuable advice and criticism whilst carrying out my task in spare time; to Principal Foulkes, of Harper Adams' Agricultural College; and A. J. Roebuck, Esq., for the excellent illustrations of diseases; also to those breeders who have contributed illustrations of their birds.

C. A. Flatt

Park Hill Lodge, Dawlish

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INTRODUCTORY

THE rapid advances made in methods of poultry-culture reflect great credit upon individual poultry-keepers, who, with little or no support, and in face of great discouragement, have improved our strains of poultry in utility characters, introduced new and better methods of management, and given their knowledge and experiences freely for the benefit of others.

But for their enterprise in seeking information and importing stock from other countries, England would be far behind America, and even the Colonies, in the matter of poultry-keeping.

In Ireland poultry-keeping has received State support with extraordinarily good results, and in Scotland the subject has received more serious attention.

English poultry-keepers have laboured under the great disadvantage of being looked upon as "cranks," and undoubtedly the manner in which this industry has generally come before the public notice has led to wrong impressions. The periodical booming of poultry-farming as a business has occasioned numbers of dismal failures, and the publication of these has in turn checked the development of poultry-keeping in more favourable directions, e.g., as an adjunct to other operations upon farms and smallholdings.

The prejudice of neighbours against the keeping of fowls, and the operation of vexatious by-laws, added to a lack of knowledge of the methods of management and possibilities of profit with a few head of fowls in a garden pen, have checked the spread of poultry-keeping in and around towns.

The education meted out through the medium of the Local Authorities has been, for the most part, inadequate and desultory. The officials responsible have received little support and encouragement officially, and few facilities have been afforded them for keeping up-to-date in their work. Still, the prospects brighten as poultry-keepers grow in numbers. The shortage in supply and rise in the price of eggs has added largely to the poultry kept on small spaces for home supplies, and has attracted the attention of the country dweller to an increased extent. Results from the improved stock and methods of treatment have been a great revelation to many, and the information spreads from one to another.

Poultry-Farming. This is a highly specialized business, the nature of which is improperly understood by the majority of people taking it up.

The knowledge and experience required cannot be gained from books or in a brief period of special instruction, and the personal qualifications necessary for making this a success are of no common order. Lack of these qualifications, and embarkation upon the business with too small a capital, have been the cause of many failures in the past, and there is some reason to fear a repetition of these.

At the best, poultry-farming is a one-man business, and success depends upon the close attention and direct interest in the results of the individual in charge.

The business exacts work on seven days a week, and the close application and long hours spent attending to small but important details are too trying for many temperaments, and only actual experience can prove to the aspirant how far he is fitted for the work.

We fear that many advocates of poultry-farming as a means to secure a living overlook the personal qualifications needed.

There are large numbers of poultry-farmers in the country making a good living from their fowls. Their systems and methods of management differ widely, and the difference in the amounts of capital involved is also considerable.

The main object and chief source of income of the majority is the production of eggs for market; but an ultimate branching out to the still more remunerative business of supplying high-class stock—sittings of eggs, chickens, and adult fowls—is general, and the operations of many of these people would be more aptly described as poultry-*breeding*.

A large number of poultry farmers, so called, are mainly poultry *dealers*, and it has often been said that poultry dealers are only comparable with horse dealers as regards the number of black sheep within their ranks. Poultry offer a big field for unscrupulous trading, and the novice poultry-keeper should take care to assure himself beforehand of the reliability of the man with whom he places his orders for stock, and is generally advised to go to the actual breeder of these.

It is not the intention of the writer of this book to consider poultry-keeping as other than an adjunct to other pursuits. And although it is hoped that the aspirant to poultry-farming may find matter of value to his education, his attention is called here to *Poultry-Farming*, by "Home Counties," *Commercial Egg-Farming*, by S. G. Hanson, and *Commercial Egg-Production*, by T. W. Toovey, amongst other literature for specialist information on the subject.

POULTRY-KEEPING ON GENERAL FARMS. For any large and stable increase in the production of eggs and poultry for consumption we must look to the farmers and smallholders. Without any increase in the stock kept it can be safely stated that the replacement of stock already existing by birds of better quality, and the adoption of improved methods of management, would double the output from the majority of farms. Moreover, the poultry-keeping operations in most cases could be very largely increased without displacement or interference with any other farming interests.

A large number of intelligent, well-informed farmers, with the necessary enterprise, have already recognized the possibilities of profit from poultry, and after assigning them a due place upon the farm are reaping the benefit.

Owing to a lack of interest, and the absence of any system of control, farm poultry have frequently been a great nuisance and of little profit. Fowls have been kept on sufferance to provide pin-money, and to help meet the weekly house-bills of the farmer's wife. With no guidance or proper assistance a great deal of the woman's time has been wasted by the lack of suitable equipment and systematic management.

The farmer has every facility for producing eggs and table poultry at the lowest cost, and, with correct management, the profit from fowls, if kept upon a scale for which the farm is adapted, is generally larger in proportion to the capital outlay than from any other class of stock.

SMALLHOLDINGS. For present purposes holdings of from five to twenty acres are considered. For such as these poultry-keeping may be looked upon as one of the most important features, and probably many of the smallholders of to-day will be the poultry-farmers of the future.

Where crops are grown it is a necessity for some sort of stock to be kept, in order to turn a profit out of that part of the crops which is unsaleable, and to provide organic manure wherewith to maintain the natural fertility of the land. More intensive utilization of the small area of land is needed to yield a living from it, and poultry lend themselves to this better than any other class of stock.

The closer attention to detail which can be given by the smallholder to his poultry will result in proportionately better results; and the smaller the holding the larger are the numbers of fowls per acre, within certain limits, which can be kept.

There can be little doubt that poultry, with market gardening, should occupy the chief attention of smallholders concerned in making their holdings yield them a living.

BACKYARD POULTRY. As an interesting and most profitable hobby poultry-keeping offers great attractions to the townsman. A pen of half a dozen laying hens occupies little space. They give a greater return in profit and afford better distraction and relaxation from business than any other kindred hobby for which a similar space could be utilized.

Quite apart from all interest, the value of the produce in the home is of very great importance.

One of the main difficulties is the renewal of stock without the necessary facilities for chicken rearing. This class of poultry-keeper is in a position to pay a price for pullets much above that at which the general farmer is in the habit of valuing them ; and if the farmers would but stir themselves to meet the demand, with their superior facilities for rearing, the resulting business would be steady and most remunerative—giving a better return in many cases than keeping large stocks of pullets themselves. The townsman is advised to get directly in touch with the rearer, instead of remaining dependent upon the middleman or dealers, whose methods of handling stock are often far from satisfactory.

ADVICE TO THE POULTRY STUDENT. It must be remembered that no rule-of-thumb methods can be laid down for dealing with live stock ; only actual experience provides real knowledge, and to secure this the procedure is necessarily slow. An apprenticeship should be served before investing any large sum in poultry-keeping, and during this time every sort of work should be undertaken and carried out thoroughly by the student. There must be no "jibbing" at work of any sort. Practice is wanted in the very simplest operations.

Even when a substantial fee is paid to learn the pupil should, for his own sake, look upon himself as an ordinary worker on the farm, not placing too high a value on his own services, but first gaining the confidence of his instructor by the manner in which he carries out duties entrusted to him. The actual work, extended over a longer period, is of far greater value than the most complete series of lectures and demonstrations; these latter may well come after a twelve months' practical experience. There is more fun where numbers of students are taken, but less work.

Fees for instruction, which are high in the case of one pupil, are inadequate for another. However willing and intelligent the pupil may be, costly mistakes are liable to occur if he is left without close supervision. An arrangement for a preliminary period of training is more satisfactory. The fee, made higher for a short period, can be adjusted upon extension, for which option should be given.

In poultry-farming there are various branches, and in any branch there is a variation in the methods profitably practised. For this reason the student should seek information of other methods than those actually taught him with an open mind; this will broaden his views and confirm his knowledge, and he will ultimately be in a better position when in business to launch out in the directions best adapted to meet his individual conditions.

In most counties lectures and classes are held in the villages, and although the instruction is not intended for poultry-farmers, there is frequently much of general value to be gleaned at these if the student will attend with an unprejudiced mind. The instructors are deserving of sympathy and support unless proved unworthy, and the co-operation of the commercial and educational exponents of the industry can but conduce to the general good.

POULTRY-KEEPING

CHAPTER I

THE GENERAL MANAGEMENT OF POULTRY

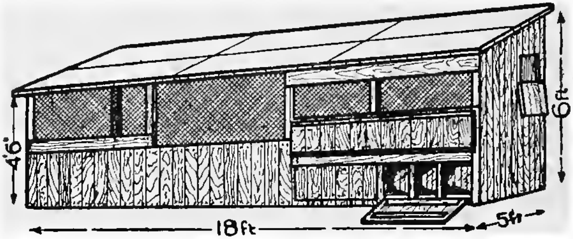
DIFFERENT SYSTEMS

THE three distinct systems under which poultry can be kept are the Intensive, Semi-intensive, and Extensive Systems. It may be mentioned at the outset that turkeys and geese are only suited to the extensive, and ducks to the semi-intensive or extensive systems.

THE INTENSIVE SYSTEM of poultry-keeping on a large scale originated in America, where conditions, in some parts, are probably more favourable for it than in this country. In a bright, cold climate, with the ground hard from frost, or covered with snow for a period of several months, we can imagine that fowls would thrive and produce better with the extra protection afforded them. But in this country, where the atmosphere is relatively dull, heavy, and moist, the difficulties of keeping them in vigorous condition are necessarily increased under intensive conditions.

Always in confinement under a roof, with no opportunity of seeking food from natural sources, we fail to see how the birds can remain as vigorous or productive as some of the intensive advocates would have us believe. That laying hens are sufficiently productive to be profitable under such conditions, upon a moderate scale, we know from our own experience, but in this country intensive poultry-keeping on a large scale has nearly always proved a failure. If it is intended to take up poultry-keeping to any great extent, sufficient land for the semi-intensive or extensive systems should be acquired, or the project abandoned.

On a smaller scale, where, in addition to good shed accommodation, even a very limited space is available for an open run, we are not prepared to advise the intensive system; but where the ground space is strictly limited we can recommend the keeping of a few laying hens intensively.



INTENSIVE HOUSE DESIGNED FOR USE AGAINST A GARDEN WALL AND SUITABLE FOR 12 TO 15 LAYING HENS

As already indicated, the birds are entirely under cover: cleanliness is therefore of the utmost importance, while skill and attention in feeding are essential to keep them healthy and profitable. Although the provision of four square feet of floor-space per bird may suffice when the houses and flocks are large, at least six square feet per bird should be allowed for flocks of less than twenty laying hens.

Made floors, which absorb less of the manurial moistures, are preferable, e.g., wood, concrete, or asphalt, with a hard surface easy to sweep and to disinfect. The floors should be raised above the outside ground level, and well bedded down with *deep litter*, so that the birds do not suffer from a continual hard surface.

Everything possible should be done to make the house *light*; not only by means of glass windows, but also by whitening the walls. The wood and canvas shutters often advocated are generally unsatisfactory: they interfere with light, and require constant attention and repair.

It goes without saying that a free circulation of *air* is necessary, for draught is better than fetid air, although both should be avoided.

Greater variety of *food* is needful than when under conditions where some natural food is available, and a method of feeding should be adopted which will keep the birds busily employed. To this end, grain mixed in the litter and dry mash feeding are mostly practised where this system of keeping fowls is followed. There are usually household scraps to supplement the purchased foods which make valuable variety. Except potato parings, there is little in this waste that need be cooked or mixed with meal; such things as pudding, bread, and meat scraps (already cooked) should be chopped into small pieces and fed without meal.

A supply of *grit* and *shell* is at all times necessary, and the use of *charcoal* strongly recommended. It is also very beneficial to carry in supplies of fresh earth at intervals for the birds to pick over.

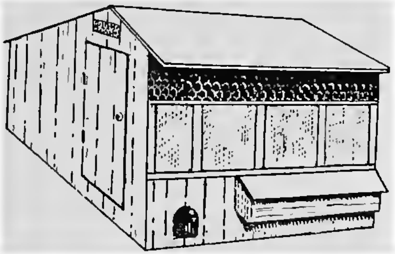
Fresh green food should be supplied regularly in sufficiency; but only so much as can be consumed whilst fresh should be given at any one time. A constant supply of clean *water* is essential.

Quietness in attending to the birds is of importance, especially when dealing with the wilder and more timid breeds. It should always be remembered that birds are very sensitive, and suffer under rough treatment.

THE SEMI-INTENSIVE SYSTEM. Under this system restricted range in the open is provided, and the laying hens kept in houses of similar construction to those used under the intensive system, and which possess the same advantages, e.g., ample space for exercising under cover in bad weather. Under such conditions they thrive and are very productive. Large semi-intensive plants have been erected for egg production—the housing accommodation being similar to that of the intensive system, an *open run* provided, allowing an acre of ground to from two hundred to four hundred birds. The actual number of birds per acre will be determined by the nature of the land; light soils can be stocked more freely than heavy soils.

The *size of the flocks* ranges from one hundred to four hundred in a unit. A considerable reduction in labour is possible with these large flocks, and the better housing conditions induce heavier production in the winter months. Other things being equal, production is still further increased with a reduction in the size of flock, but with a proportionate increase per head in cost of equipment and labour it remains an open question whether there is any gain from such increased production. While it is admitted that more labour in proportion is involved with flocks of fifteen to twenty birds, as against those of a hundred and upwards, yet under a good system of management, planned to minimize work, small flocks will yield a larger return per bird and they have the added advantages of reducing the risk of loss from epidemic disease.

The *open runs* may be either of grass or arable land—two runs being provided for each house, and used alternately. The ground freed, if arable, should be cropped—thousand-head kale being one of the best crops to grow, as it provides abundance of food, and at the same time affords shade from the sun; when well-grown taking up little space near the ground. Grass land must be less heavily stocked, and a crop of hay taken from the pens alternately—endeavour, also, being made to keep the grass fairly closely cropped in the occupied pen.



SEMI-INTENSIVE COMBINED SCRATCHING SHED HOUSE
7 ft. square, suitable for 12 to 15 laying hens

In the case of small flocks, a single pen of increased area will effect a saving in netting, and is to be preferred if the pen can be freed for a month or two in the latter part of summer, the birds being sold and replaced later, or placed out on free range for the short period.

There is a great tendency to shelter birds kept on the semi-intensive system to an unnecessary extent. With the object, no doubt, of accelerating production, they are kept shut in their houses too much and to no good purpose. It could quite safely be laid down as a rule that trap doors should be opened daily at a definite time, except when snow lies on the ground; even then, if a broad patch is swept clear of snow round the outlet the birds will suffer no ill effect. When accustomed to freedom they will fret at confinement, and the results to production be more affected by this than by slight exposure to bad weather.

Sometimes, owing to lack of sufficient light in the houses to make them attractive, or absence of means of occupation—such as scratch-feed in the litter or dry mash—the birds will stand about in the open runs or at the entrance gate in bad weather; but they will use their shelter if made attractive, even with the trap open, when they find the discomfort of adverse conditions outside. A wind-shield round the trap door, to overcome direct draught across the floor when the trap is open, is recommended. Other details of management should be carefully followed on lines similar to those mentioned under the intensive system.

The keeping of large flocks with no other shelter than a roost cannot be recommended. Even the farmer, with a large flock free to roam, is well advised to provide the extra accommodation such as a scratching shed affords. Yet a small number of layers in a house sufficiently large for roosting only, and with a nice run, will frequently explode the theory that scratching sheds are a necessity for heavy winter production; and the man with an elaborate and costly shed may often find himself envying the results his neighbour is getting with only a mean little building for the hens. The explanation probably lies in a gift for feeding and management.

THE EXTENSIVE SYSTEM. Of all systems of poultry-keeping the extensive is the most profitable in localities or on farms where the birds can be given a wide free range on which they can pick up a large part of their living at certain seasons, and reap the benefits of more natural conditions. It is the farmer and smallholder who are chiefly interested in keeping fowls on free range, and a separate chapter is devoted to the subject. For the poultry-farmer with flocks running into thousands the extensive system is obviously unsuited, and its adoption can only be recommended upon a scale that will not interfere with the use of the land for other purposes also.

Fifty birds to the acre can well be run upon meadow land used for grazing. If housed in large flocks, a scratching shed is preferred, while in numbers of ten or twelve the small portable house is recommended. The conditions under which this system can be adopted are so variable that no general plan for guidance can be laid down. But a definite method of procedure is necessary to reduce labour—the plan being devised after due consideration of the conditions.

Wherever common land is available the small poultry-keeper should take advantage of it if he can. With birds on free range, attentions to details of food supply are less exacting and the health of the birds more assured, and the increased labour in one direction will be equalized by saving in another. In some districts foxes cause such grave losses amongst birds kept on free range that this is absolutely impossible. Geese and turkeys flock together and are easily driven home at night, but fowls are less easy to manage. But with a suitable shed or a small run attached to the house, they may be got into safety before dusk, by regular habit in feeding. Cleanliness is of equal importance upon this system.

GENERAL MANAGEMENT. There is no doubt that the cost of *cleaning* is a serious item in the labour bill, but lack of it will be likely to have a far more adverse effect upon the profits. The matter of first importance is to provide good facilities for cleaning. Droppings boards should be scraped down every second day at least. Manure pits, used instead of droppings boards, require weekly disinfection. For large houses these pits have some advantages by way of labour-saving, besides serving for storage. A sprinkling of sand or dry soil upon the droppings board is advised. Ashes or dry lime are not so suitable.

There is no excuse for *insect pests* in a fowl house. Their appearance is due to neglect, but if discovered steps should be taken to stamp them out at once. Creosote oil is unequalled for this purpose, and should be painted into every crevice. The soaking in water and scrubbing of perches, boards, and troughs periodically with soap is to be recommended.

Exercise. There is a limit to the amount of exercise which is good for a laying hen. To prevent birds from getting fat, grain is often too zealously buried, and green stuff hung out of reach by way of providing exercise. Gentle exercise is good, but as much from the fact of employment making the birds content as for the sake of exercise. Over-working laying hens has often been proved the cause of the poultry-keeper's failure to secure eggs from healthy fowls when receiving the normal allowance of food.

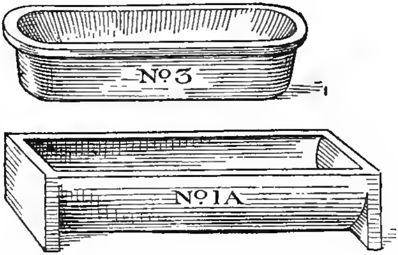
Litter. The litter used is largely a question of what can be most economically obtained. Oat straw is best for scratching litter or for bedding down ducks, and wheat straw chaff for chicken brooders, but other material suitable may be had more cheaply. The refuse short straw and chaff after thrashing, known as "doust" or "cavings," is excellent, and can sometimes be had from a farmer for little more than the trouble of fetching. Dead leaves or bracken ferns stacked and dried are economical and good, but these quickly break down to dust, and so require more frequent renewal. So far as possible the avoidance of dusty material is advocated; for this reason and its expense peat moss is not favoured. Peat moss may sometimes be available by paying a trifle for common rights and the expense of cutting and carting, and being highly absorbent it is most suitable for placing under the perches.

Sand is much used for little chicks as bedding in a foster-mother. This, though good, holds the heat beneath the chicks, where it is not wanted, and chaff is preferable.

Ashes, often so easily obtainable, cannot, unfortunately, be recommended. The smell when mixed with the manure is offensive, and their dusty nature a drawback. Ashes dry and loosen the scales on the birds' legs, and although valuable as a dust-bath are unsuitable scratching litter.

Manure. The value of poultry manure is becoming better recognized, and the poultry-keeper should preserve it for his own use or for sale. As the manure is collected it should be mixed with an equal quantity of dry soil, and kept from damp. It will then retain its value and be in the best form for use.

Water, Shell, and Grit. These should always be freely supplied to birds if not naturally available.



GLAZED EARTHENWARE DRINKING TROUGHS

Water should be clean and fresh daily and given in open vessels which are easily cleaned. Sun-heated water should be avoided. The use of stagnant ponds and yard drainings is undesirable. *Grit* is needed to help digestion, and even birds on free range will often require a supply. A heap of gravel or of road sweepings often serves the purpose with a small flock, and if, as frequently happens, such materials are to hand, it is more economical to use them than to purchase the grit specially prepared by poultry-food vendors. It should be of a hard nature—flint being the most suitable. Broken crockery is appreciated by the birds, and may be given, but is not a substitute for grit. Glass is useless, and often harmful.

The *lime* in shells supplies material needed for formation of egg shell: oyster shell is the best. Old mortar and chippings from limestone quarries can be used as a substitute.

Charcoal. Although this has been freely advocated, its value for all classes of poultry is still insufficiently appreciated. For laying hens, birds fattening, and for young growing birds in particular, fine charcoal mixed in a dry or wet mash is strongly recommended as an aid to digestion. A proportion of four per cent. mixed in the food is sufficient, or this can be placed in a separate box, free of access, in the same manner as grit and shell.

Care of Equipment. Incubators and sitting boxes should always be left clean at the conclusion of a season. Before the bad weather sets in coops and foster-mothers which are to be stored in the open should have their roofs made sound, raised from the ground on bricks, and placed where the air can circulate freely. They should be sheltered as far as possible, but not stacked close to a wall. They should be painted or tarred at the end of the summer.

Creosote is a good preservative, and cleaner to work with than tar; but is not so good. Tar is much to be preferred for fowl houses, and before a house is erected the underpart of the frame and boards need well tarring, also the boards on the inside for a foot from the ground.

Water and food troughs should never be allowed to be about when out of use. Everything should be kept neat and tidy.

Disinfection. Lime-wash, mixed with Jeyes Fluid and size, is an excellent general disinfectant for the walls of coops, brooders, and houses, and makes these much lighter inside. If thoroughly done in the first instance, spraying with a strong disinfectant periodically is considered sufficient afterwards, but for freeing the woodwork from insect pests, creosote should be applied with a brush. The walls and sills should always be thoroughly swept before spraying. For the interiors of incubators and foster-mothers, five per cent. formaldehyde solution (formaline) is recommended.

CHAPTER II

THE SELECTION OF A BREED

THERE is no intention of dealing in this chapter with all the breeds and varieties of fowls; only the most notable utility breeds are discussed. No mention has been made of certain breeds in which there is a minority of good strains, carefully selected by specialist breeders, but which on the whole are such as cannot receive recommendation in a general way. The writer also feels that the general character of the book will be sufficient explanation why mention of certain famous strains has been omitted.

In considering the usefulness of a breed there are various characters to be taken into account, and a selection should be made with definite reference to the main purpose for which the birds are required, and the conditions under which they will be kept.

USEFUL FEATURES FOR CONSIDERATION. These may be stated as follows:

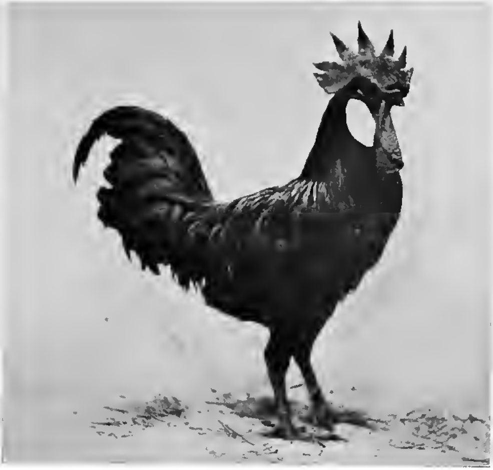
The power of egg production in the hen and the activity of the cock.
The quantity and quality of flesh in relation to the size of the bird and the proportion of bone.
Docility or wildness of character.
The relative amounts of food consumed.
Rapidity of growth and general vigour under adverse conditions.

There can be no question that certain breeds which have been subjected to careful selection for many generations, with a view to improvement in egg production, do excel both in laying and in the capacity for laying at seasons of the year when eggs are scarce and command higher prices. Others, selected for the improvement of flesh qualities and rapidity of growth, stand out distinctly as excelling for the production of table poultry. No combination can be made giving superiority in one breed over others in both these respects.

While there are many breeds which appear capable of improvement in utility characters, and some which show special promise in the matter of winter egg production, the fact remains that certain breeds of fowls are far in advance of others. These breeds, after subjection to selective breeding for a long period, have their special characters more firmly established and widely distributed. It follows, therefore, that the poultry-keeper will attain good results more quickly and with greater certainty by commencing with a breed of long established strains than with later introductions which, although good at the time, are more subject to the risk of reversion.

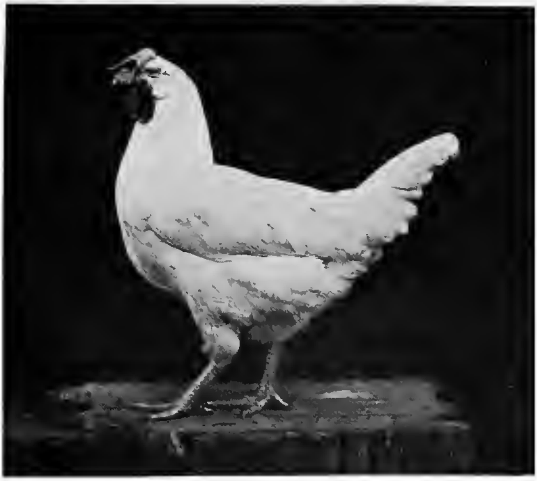
VALUE OF EXTERNAL CHARACTERS IN SELECTION. Little account need be taken of the style of *comb* in selecting a breed. The preference for a rose-comb breed on the score that this is less susceptible to frost-bite has frequently been over-emphasized. A large single comb, as seen in show specimens, is a distinct disadvantage in this respect, but in utility strains the single comb is of reasonable proportion.

A *beak* that is short, strong, and curved denotes hardiness. Although the beak shows considerable



SINGLE COMB MINORCA COCKEREL

ILLUSTRATING THE LARGE COMB, LOBE, AND WATTLES OF THE EXHIBITION TYPE



WHITE LEGHORN HEN

EXHIBITION TYPE

(COMPARISON SHOULD BE MADE WITH THE FRONTISPIECE)

variation in individuals, there are certain types which are characteristic of special breeds. For instance, the Campine has a straighter and more slender beak than the Rhode Island Red.

Bright *eyes* are indicative of activity and good laying. Deep set eyes, with overhanging brows, are usually a sign of strength. Some importance attaches to the *face*, *earlobes*, and *wattles*. These should be small and in proportion for utility purposes. The slovenly appearance given by unduly large face and wattles is quickly noted, and a sure sign of poor fecundity.

Whether there is any particular relation between *colour of plumage* and prolificacy remains unproved; though the premier laying breeds are both white, there are coloured breeds which seem likely to equal them. The colour is not merely a question of taste. When the birds are to be kept on the extensive system, they will be exposed to natural enemies, who can take advantage of the visibility of light coloured birds. Both in daylight and at dusk foxes will be more attracted, and rooks and other birds of prey make greater depredations amongst white fowls and chickens.

The description "wedge" is given to that *shape of body* which is desirable in birds kept for egg production. This character is very marked between breeds as well as between individuals of a breed. The square body has a better capacity for carrying flesh, and is therefore desirable in table fowls.

A *tightly feathered* fowl is better protected and hardier for utility purposes. A heavy coat is not desirable, and superfluous feathers, which are unnecessary for the protection of the bird, are uneconomical.

The *yellow-coloured leg* is a sign of hardiness. The yellow-legged breeds thrive better on wet soils than white-legged varieties. The colour of the skin is the same as that of the legs. A white skin is finer in texture and more delicate eating.

In a good layer the *shank bone* is slender, and even for table purposes large, coarse-boned birds are uneconomical.

USEFUL BREEDS AND VARIETIES. *The Leghorn.* The most popular breed in several countries is the White Leghorn. For a great number of years special attention has been given to selection and breeding for egg production. This breed has now become the most prolific layer of white-shelled eggs of satisfactory size.

These birds will thrive upon any system of poultry-keeping, their active habits keeping them healthy and content with scratching in litter supplied on the intensive system, and making them equally good in foraging when on free range conditions.

Small and light in weight, they make indifferent table fowls, and are less easy to keep within bounds in small enclosures.

They are small feeders in proportion to their heavy production of eggs. Maturity is rapid, the pullets frequently laying at five months old, and a considerable proportion of these birds are worth retaining into their second and third seasons, for the sake of egg production.

Compared with some breeds, the chickens cannot be termed hardy ; this is probably due to the fact that so many of their ancestors have been bred and reared under artificial conditions, and this, added to the prolificacy of the parents, has impaired stamina. Particular care should therefore be paid to the selection and management of the breeding stock.

The brown and black varieties of Leghorn, which have similar characters, have received less attention than they deserve, and offer great possibilities. Strains of the former, imported from Denmark twelve years ago, proved most prolific when under my care, and, although less numerous than the white, there are many good strains of both varieties in this country. The dark plumage has some distinct advantages.

The Wyandotte. For a considerable period the White Wyandotte held sway as the most popular breed in this country. A prolific layer of tinted or brown-shelled eggs, maturing quickly, and proving a good sitter, it is in many cases still preferred to the Leghorn for its all-round usefulness. There is a considerable proportion of Leghorn blood in many strains, some of which only compare with a medium sized Leghorn in weight, but the true type should be larger than this, when their good shape make a satisfactory bird for table. The great fault to be found with this breed is the small size of the egg in many strains.

Suitable either to intensive or extensive methods, for the small poultry-keeper or the farmer who keeps only one breed, and depends upon hatching by natural methods, the Wyandotte is preferable to the Leghorn. Like this latter breed, the chickens are not vigorous, and the male less active than the Leghorn.

The Silver and Columbian Wyandottes are both worthy of attention by the utility breeder; they possess more size and vigour than the White variety, but as layers are by no means its equal.

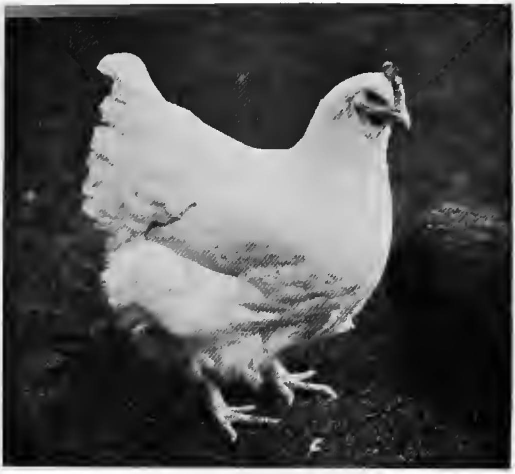
Rhode Island Red. This is an excellent layer of brown-shelled eggs of large size, while the cockerels are of moderate quality for table purposes. Of normally broody character, the hens sit well and make excellent mothers. This breed is notable for vigour, as shown by the high fecundity of the male and the small mortality and rapid growth of the chickens. These features go far to recommend it as a farmer's fowl. The single-combed variety has received greater attention and given superior results as a layer than the rose-combed variety.

The unevenness of plumage colouring, and the lack of uniformity in the appearance of a flock, which is accentuated after the adult moult, and creates the impression of a lack of purity in the breed, are drawbacks ; but this does not affect the utility value of the breed, although they reduce its popularity.

Plymouth Rocks. This name, used in a general way, is taken to mean the barred variety ; but there are many other varieties, some of which present promising possibilities.

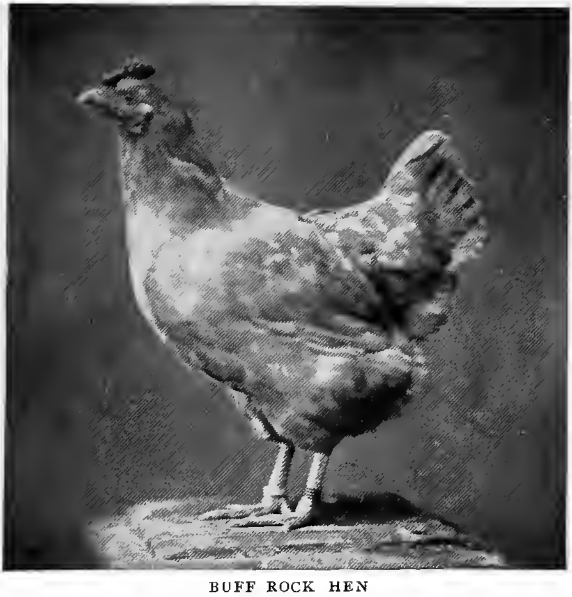
The Barred Rock needs reviving, as few strains retain that desirable character for winter laying which was once a recognized feature of these birds. A layer of brown eggs of large size, the pullet does not mature sufficiently rapidly for early laying, but is vigorous and hardy. The young cockerels make good table birds, and the hen is a satisfactory sitter. The breed is popular for crossing to produce large table fowls, and hardy, prolific layers are secured when crossed with a Leghorn or Houdan cockerel.

The Buff Rock has outclassed the Barred for egg production ; but in other respects the characters are the same. Black specimens of this breed,



WHITE ORPINGTON HEN

LLUSTRATING THE SHORT LEGS AND HEAVY FEATHERS OF THE EXHIBITION TYPE



BUFF ROCK HEN

A RECORD LAYER. BRED BY HENRY SUTTON

many of which are thrown from a barred mating, and have all the Rock characteristics, are exceedingly good layers and hold great possibilities.

The breed is not well adapted to intensive conditions, but most suitable for the farm.

The Ancona. This is a most profitable breed for egg production, as it is very prolific, and consumes but little food. Of a wild disposition, the Ancona is an excellent forager on the extensive system, but, nevertheless, very quickly becomes accustomed to intensive conditions, and under both systems proves a heavy layer of white-shelled eggs of average size.

A small bird, it is one of the poorest table fowls—the cockerels, when drawn, losing one-third of their live weight.

The chickens are fairly hardy, but thrive better when reared apart from breeds of the heavier type. This applies to all light, non-sitting breeds.

The Orpington. When looking for a breed of superior quality flesh for table purposes, we turn to those possessing a white skin. Laying qualities, especially in the early months of the year, are also desirable. White Orpingtons are in these respects most satisfactory. The hens of this variety do not equal the Buffs as layers, of which there are a number of highly prolific strains, but the White cockerels fatten better than the Buffs—which do not show to advantage the amount of meat carried on the breast.

Layers of large, brown-shelled eggs, and one of the best sitting breeds, the Orpington is docile and does very well under intensive conditions, but is still better upon open range, though it does not thrive upon heavy, wet soils.

The Sussex. For quality of flesh, combined with size, and a temperament suitable for fattening, the speckled and red varieties of this breed are unequalled, except by the Dorking. The Light Sussex, combining good laying powers with flesh production, is, however, a more useful and popular variety. Though doing well under semi-intensive conditions, the breed is better adapted to free range. Upon light and well-drained soils these birds will thrive, the chickens growing rapidly, and make the finest of table fowls, for which purpose they should be chiefly recognized.

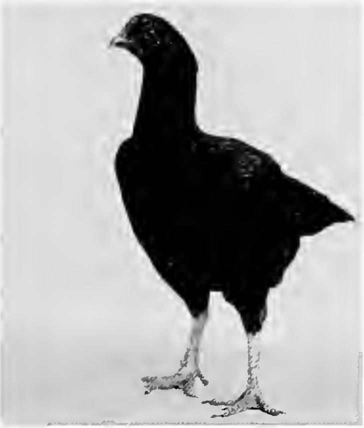
While the Light Sussex is a good layer, the other varieties are but moderate, the pullets not commencing to lay before seven or eight months old.

Indian Game. This breed is a heavy feeder, slow to mature, and a poor layer. As a layer or a table bird—kept pure—it is not economical, and has no claim to utility value except for crossing purposes, in which direction, for producing heavy birds carrying a large proportion of meat shown to advantage on the breast, it is greatly to be advocated, Crossing leads to increased rapidity in growth, and, if a hen of another good laying breed is chosen for mating, utility in table production is secured. On the other hand, if the male of a laying variety is chosen to mate with the Indian Game hens a very good table bird results, and the pullet progeny are a considerable improvement for laying purposes upon the same cross with a Game male.

Suitable crosses are :

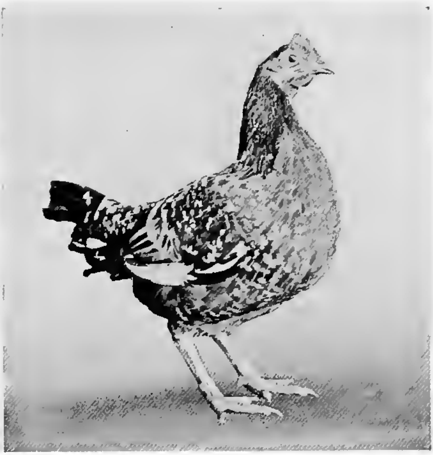
Indian Game (cock)—Sussex or Orpington (hens) for large table birds.

Minorca—Indian Game for large table birds and improved egg production.



INDIAN GAME PULLET

A TYPICAL SPECIMEN BRED BY A. H. BROWNSON, ESQ.



SPANGLED OLD ENGLISH GAME PULLET

POSSESSING A GOOD LAYING RECORD. BRED BY A. H. BROWNSON, ESQ.

Old English Game. This valuable breed cannot be omitted. Only suited to free range conditions, the birds are such fighters that a limited number must be kept. Hardy, excellent table fowls, they are good layers and economical in feeding. The cock is much preferred to the Indian Game for table crosses, for although not producing such large fowls they are more delicate in quality.

The Minorca. This breed is a non-sitter, lays white-shelled eggs of exceptional size, and makes a good table fowl. Its claims as a layer are marred by slowness in attaining maturity. It is often eight months before the first egg is laid. These birds are also heavy feeders.

There is an unfortunate absence of utility strains of this otherwise valuable breed, and particular care should be taken to avoid strains with the exaggerated size in comb, lobes, wattles, and length of leg required in exhibition specimens, as these characters render the bird susceptible to cold weather and lengthen the period before the pullets come into production.

Although less hardy than the Leghorn and Ancona, the Minorca will thrive under ordinary good conditions on a genial soil, either under the intensive or extensive system, and is worthy of greater attention from utility breeders.

The Andalusian. The remarks on the Minorca apply equally to this breed.

The Houdan. For quality and quantity of flesh in proportion to bone and offal, combined with good production of large white-shelled eggs, this breed is hard to beat. It has, however, features which condemn it for economical purposes as a pure breed. The birds are delicate and very susceptible to damp, partly, as a result of the topknot of feathers, which also makes them shy and nervous. It is always advisable to clip the feathers well back to clear the vision.

Although not naturally adapted to utility purposes in this country, the breed is exceedingly valuable for crossing; the males mated with hens of any other breed lead to improvement in both egg production and flesh quality, also promoting rapid growth.

Crosses specially recommended are:

Houdan—Orpington or Rock.
Houdan—Leghorn or Minorca.

The Favorelles. Although not excelling in either direction, these birds are good utility fowls on the extensive system, their chief value lying in their rapid growth. They make large table fowls, with good quality flesh; the eggs are generally small in size, but the pullets are good layers.

In crossing for table the Favorelles can be strongly recommended, using Favorelle cocks with Orpington or Sussex hens—this proving a more profitable cross than that with Indian Game cocks.

The *Campine, La Bresse, Malines,* and *Buttercup* fowls all possess some claim to utility value, but at present do not merit special attention in comparison with the other breeds mentioned. This also applies to other varieties of the breeds described, purposely omitted since these have as yet no claim to equality for useful purposes.

CONSUMPTION OF FOOD. A wide difference is noticeable in this respect between different breeds. An experiment reported fifteen years ago showed a difference of forty pounds of food consumed in twelve months as between individuals of the breed responsible for the heaviest consumption and those consuming the least. Some difference is to be expected in view of the extra size and feathering of certain breeds, while lethargy and a natural tendency to lay on fat are other factors. Such a difference as that shown would largely affect the profits in egg production, and allowing ample margin for error in an experiment of this nature, there is yet room for serious consideration of the point.

Personal observation would place the breeds as follows and in the order named :

HEAVY FEEDERS	MODERATE FEEDERS	LIGHT FEEDERS
Indian Game	Rhode Island Red	White Wyandotte
Minorca	Buff Rock	White Leghorn
Barred Rock	Buff Orpington	Black Leghorn
Speckled Sussex	Andalusian	Ancona
White Orpington	Light Sussex	

EGG PRODUCTION. When the difference in this respect is also considered, it will be seen how the margin of profit between different breeds may vary. The average from small flocks of good laying strain can be placed approximately at :

White Leghorn	180 eggs per annum
White Wyandotte	170 ,, ,, ,,
Rhode Island Red	160 ,, ,, ,,
Buff Orpington	160 ,, ,, ,,
Buff Rock	150 ,, ,, ,,
Minorca	150 ,, ,, ,,
Ancona	150 ,, ,, ,,
Light Sussex -	140 ,, ,, ,,
Red and Speckled Sussex	120 ,, ,, ,,
Barred Rock	120 ,, ,, ,,
Indian Game	80 ,, ,, ,,

PURE BREEDS VERSUS THE FIRST CROSS. There can be little doubt that when judiciously selected the cross between two pure breeds generally results in more vigorous chickens, leading to more rapid growth for table chickens, and hardier, equally prolific pullets for laying. There are, however, two strong arguments against a cross breed—(1) the pullets are not suitable for selective breeding—a cross-bred fowl should never be bred from; and (2) the opportunities for selling sittings and surplus stock are more favourable if the breed is kept pure.

CHAPTER III

THE FEEDING OF POULTRY

A KNOWLEDGE of the chemical composition and approximate values of feeding stuffs is of considerable importance in the feeding of poultry; and when, in addition, some acquaintance with the requirements of the animal body and practical experience in the use of foods has been gained, the poultry-keeper will be placed in a position to secure improved results.

In these days of better education it is a simpler matter to acquire sufficient knowledge of the science of poultry feeding, to make the work interesting and more profitable.

The wasteful methods of the past were neither profitable to the individual feeder nor economical to the nation, and it is safe to predict a great increase in the profits from poultry-keeping, following the more general application of scientific knowledge.

COMPOSITION OF FOODS. A table of analyses of the commoner foods is here given, together with a simple description of the practical use of the various groups of compounds.

Water. It will be seen from the table that water is present in greatest quantity in green stuff and potatoes, where more than three-quarters of the weight is water, while it is least in the grains and meals.

Within certain limits deficiencies in the amount of water in foods can be made good by added water, but excessive dryness in the diet is to be avoided to prevent the fowls drinking to excess. The high proportion of water in green vegetables is one of the reasons why this class of food is so valuable. It should be noted that an egg contains seventy-five per cent. of water.

ANALYSIS OF FOODS

	Water	Albuminoids or Proteids	Fats or Oils	Carbohydrate	Ash	Fibre	Albuminoid Ratio
Wheat	13	12	2	69	2	2	1 to 6.1
Barley	14	10	2	67	2	5	1 to 7.1
Oats	13	11	5	57	4	10	1 to 6.2
Maize	11	10.5	5	70	1.5	2	1 to 7.7
Middlings (fine)	12	15	3.5	62	2.5	5	1 to 4.6
Sharps (coarse)	12	15	4.5	57	3.5	8	1 to 4.5
Bran	13	14	4	56	4	9	1 to 4.6
Pea Meal	14	23	1.5	54	1.5	6	1 to 2.6
Bean Meal	14	25	1.5	48	4.5	7	1 to 2.0
Oatmeal	9	18	6	63.5	2	1.5	1 to 4.3
Maize Germ Meal	12	14	8	57	4	5	1 to 5.4
Brewers' Grains (dry)	10	20	7	42	5	16	1 to 2.9
Brewers' Grains (wet)	75	5.5	2	12	1	4.5	1 to 3.0
Malt Culms	10	23.5	2	44	8	12.5	1 to 2.0
Clover Hay	16	13	2.5	37	6.5	25	1 to 3.3
Cabbage	85	2.5	.5	7	2.75	2	1 to 3.5
Swedes	88.5	1.5	.25	8	.25	1.5	1 to 5.7
Mangles	88	1.25	.25	9	.5	1	1 to 8.5
Potatoes	75	2	.25	21	.75	1	1 to 10.8
Milk (whole)	87.5	3.5	3.75	4.75	.5	—	1 to 3.8
Milk (separated)	91	3.75	.1	5	.15	—	1 to 1.4
Egg	74.7	12.6	12.1	.6	—	—	1 to 1.0

Albuminoids or Proteids. This class of foodstuff is mainly concerned with the production of muscle or lean meat, of tissue, horn, feathers, and for egg production: half the solid matter of the egg is composed of albuminous substances.

The food of fowls should contain from twelve to fifteen per cent. of albuminoids, but it should be noted that the albuminoid content in animal foods—meat, fish, and milk—is not only in high proportion but in more digestible form. A mixed diet containing due proportion of these foods is therefore most desirable.

Not only does an excess of albuminoids in the diet give rise to digestive troubles in the fowl, but since this class of food is one of the most expensive, an undue proportion entails considerable financial loss.

Fats or Oils and Carbohydrates. These foods provide the energy necessary to keep the body in activity. The "energy" is not only concerned with obvious body movements, but also with the necessary activity of the internal organs, and the production of heat for maintaining the body temperature.

As energy producers, fats are much more valuable than the carbohydrates: one pound of fat being equal to two and a half pounds of carbohydrates. In addition to this, fats are more easily digested and assimilated into the system. The proportion of fat in the diet must however be limited, or digestion will become impaired.

The best diet for fowls should contain five to six per cent. of fats, and thirty-five to forty per cent. of carbohydrates, but in the fattening of fowls these proportions may be profitably increased.

Ash. A considerable proportion of the ash consists of lime and phosphates, both of which are of particular interest to the poultry-keeper for their value in bone and eggshell formation.

Other substances coming under this head are valuable in their tonic effect, fresh green food being particularly so in this respect.

From four to five per cent. of ash is desirable in the diet of both growing chickens and the laying hen. In the case of the latter the amount necessary for shell production is increased by allowing the hens access to supplies of oyster shell.

Fibre. Poultry are notoriously bad digesters of fibrous material, yet several foods containing a very high proportion of fibre rank high by reason of their other valuable constituents. Fibre is also useful in providing bulk.

The nutritive value of a food is lowered with the increase of fibrous material, and its price should be proportionately reduced.

BALANCED RATIONS. The foregoing explanations of the amounts of the various food constituents required by fowls will lead to a better understanding of what is meant by a *balanced ration.*

The compounds of chief nutritive values are divided into two classes: (*a*) The albuminoids, which are required for the building and repair of body tissue; and (*b*) the fats and carbohydrates, which are the energy producers. The nutritive value of the other compounds is small and need not be considered in balancing a diet.

The proportion of albuminoids to fats and carbohydrates should be one to four and a half. In order that the proportion in the food may be correctly ascertained, the fact that the fats are capable of producing about two and a half times as much energy as the carbohydrates must be borne in mind, and we must first state the fats in equivalent terms of carbohydrates, i.e., the percentage figures of fat are multiplied by two and a half, and the product added to the figures given for carbohydrates in the table.

By dividing this sum total by the albuminoid content in the food the proportion is obtained.

For example, the analysis of wheat shows:

Albuminoids -	12 per cent.
Fat - -	2 per cent.
Carbohydrates - -	69 per cent.

Multiply the oil figure by $2\frac{1}{2}$ ($2 \times 2\frac{1}{2} = 5$), and add this to carbohydrates figures ($69 + 5 = 74$). $74 \div 12$ gives 6.1, i.e., the albuminoid ratio is 1 : 6.1.

This example of working out an albuminoid ratio is given to assist the student who is desirous of working out his own rations; yet, once he has grasped the reasons why certain mixtures are recommended, and the albuminoid ratios of the different foods given in the table, he can feed with sufficient accuracy for practical purposes.

FOOD UNITS. To be able to find the cost of a food in proportion to its feeding value is also of interest to the poultry-keeper. This is done as follows:

The sum of the albuminoid and fat figures is multiplied by two and a half, and added to the carbohydrates; this gives the total number of *food units*. The price per cwt., in pence, divided by the number of food units, gives the cost of each unit. A comparison between the foods on this basis is of great value when feeding on a large scale.

FEEDING IN PRACTICE. A ready grasp of the theory of feeding is of itself by no means sufficient to make a successful feeder of live stock. Practical experience is of even greater importance.

Variety of food is needed, but sudden changes should be avoided, particularly in the case of laying hens. Observation will teach the difference in the palatability of the various foods. Climate, soil, and other local conditions are very variable, and the practical man will adjust the diet of his fowls so as to make good deficiencies arising under his particular conditions. Only experience will teach many small details which add to success.

Different methods of feeding may give equally good results, but the effect of local conditions must be taken into consideration in adopting a method. It is necessary to lay emphasis on this point, since too frequently the enthusiastic " expert " advocates some particular method of his own as the " best " without considering special local conditions. These are (*a*) the conditions under which the birds are living; (*b*) the convenience of the poultry-keeper; (*c*) the facilities for obtaining the particular foods recommended.

Three forms in which the food is given may be briefly described, i.e., wet mash, dry mash, and grain food.

Wet Mash. The meals may be mixed with water overnight, or several hours beforehand, and either steamed in a cooker or left covered with a sack; and before feeding rubbed up with dry meal, preferably middlings, to make the mixture palatable. It is sufficient, however, if they are mixed with hot water shortly before feeding.

With cooked meat or vegetables it is better to prepare the food just before use. The meals should be mixed with the liquor used in cooking, and fed warm. In cooking vegetables the water used should be limited in amount, or more liquid will remain than can be absorbed by the meals, when much of the value of the vegetables will be lost in surplus water. The vegetables and meat incorporated in a mash need to be finely chopped before mixing with the meals, to ensure their being eaten by the fowls.

For a small number of birds, household waste, such as requires this, can be cooked on a kitchen stove, but when special arrangements have to be made for cooking it is questionable whether this is economical, though such food is very valuable.

Fish and meat meals should always be scalded or steeped, and a small proportion can be added to the household waste, which is generally deficient in meat food.

The final condition of the mash should be crumbly and fairly dry.

Provided good quality meal is used a wet mash has the advantage of bulk and is easier to digest, but the making involves more labour.

Wet mashes should always be fed in a trough or upon a board, made to avoid dirt and waste.

Dry Mash. Meals fed dry lead to economy in labour, since a moderate quantity can be prepared and stored in readiness for immediate use. In the majority of cases the poultry-keeper is well advised to make his own mixture. He is then sure of the formula and the quality of the various ingredients. Even for a small number of birds this is advocated. One of the uses of dry mash is that it keeps the birds employed if their run is limited. Added to this, errors in judging the quantity required are eliminated.

The food is made accessible to the birds for several hours at a stretch. This is a favourable condition for individuals, who would otherwise suffer in competition from their inability to secure a sufficiency from wet mash given at fixed times and speedily cleared up by the flock.

While not so bulky as wet mash, the dry mash is a less concentrated form of food than grain, ingredients such as bran and clover meal figuring largely in its composition. Unless fed in properly constructed hoppers dry mash is apt to be wasteful.

Grain Feeding. Although labour saving, feeding upon grain only cannot be recommended for economy. It is not conducive to maximum production except at certain seasons of the year, when the birds have unrestricted range for securing insects and young green food in abundance.

For the reason that grain produces full activity of the digestive organs its inclusion in a diet is advantageous; for the purpose of keeping the bird employed grain should always be fed in litter. Even when birds are kept upon the extensive system this practice should be followed wherever facilities permit.

When kept out on the fields, the grain can be scattered broadcast (sparrows permitting), but if given in this manner a new spot should be selected frequently in order to avoid spoiling the grass and contaminating the ground. Scratching by the fowls is a good way of effecting an improvement in rough grass.

METHODS OF FEEDING. It is not suggested that any one of the systems explained is by itself better than another or suitable to all conditions. Combination of these is desirable in every case, and some of the methods adopted with highly successful results are given in tabulated form.

The methods given refer to the feeding of adult fowls, and not to chickens, turkeys, or water fowl, which are dealt with in a separate place. Raw, green food is given in addition, and can be supplied at the same time as either the morning or midday feeds.

No. 2 method is preferable when wet mash is used, since the time of feeding this generally affords better opportunity for the heating and preparation of the food.

No. 4 method is more suitable with large flocks, as the house waste available will probably be of little consequence.

	Times of Feeding, Nature of Food, and Approximate Quantity per bird			Systems for which Adapted
No. 1	7.30, Wet mash 1¼ ozs.	11.30, Grain ¾ oz.	4.0, Grain 2 ozs.	Semi-intensive or Extensive
,, 2	7.30, Grain ½ oz.	10.0, Wet mash 1½ ozs.	4.0 ,, 2 ozs.	Intensive, Semi-intensive, and Extensive
,, 3	7.30 ,, ¾ oz.	10.0, Dry mash*	4.0, Wet mash 2 ozs.	Intensive or Semi-intensive
,, 4	7.30 ,, 1 oz.	10.0 ,, *	4.0, Grain 1½ ozs.	,, ,, ,,
,, 5	7.30 ,, 2 ozs.		4.0, Wet mash 2 ozs.	Extensive
,, 6	7.30 ,, 2 ozs.	Dry mash† ..	——	——

* Dry mash hopper open from 10.0 until 2 0 p.m. † Hopper open all day.

The claim made for any one method as the best is misleading, in view of different conditions and facilities; thus, No. 5 would be quite suitable where fowls have free range on a farm, while No. 6 is the most useful system for the busy person with little time for looking after the birds during the day.

Under semi-intensive conditions feeding can be cut down to twice daily from late spring until early autumn, while under the extensive system once daily is generally sufficient during this period.

Quantity of Food. It is not advisable to rely upon feeding by weight. As will be seen under the above methods, four ounces per head is reckoned when no dry mash is supplied; this is an approximate quantity only.

The dry mash hopper is kept replenished. This means that under-feeding, which is as common a cause of empty egg baskets as over-feeding, is not likely to occur even with inexperienced people, but care must be taken that the dry mash formula is properly balanced.

Although four ounces can be reckoned as the average quantity per day for a fowl, it will be readily understood that with external conditions and the needs of the bird varying, adjustment of quantity must be made from time to time. In this direction skill and judgment must be expected of the person feeding.

Green Food. Fresh vegetable food is of the utmost importance to all classes of poultry, and, unless the birds are being fattened, may be given without stint. The most economical but at the same time more laborious method is to give the green vegetables chopped small in a trough; otherwise these should be suspended for the fowls to break off small pieces. Roots are best cut into halves, and either placed on the ground or, better still, impaled on a stump.

The two simple examples given of both wet and dry mashes, together with the grain ration recommended, are only instances of many suitable diets which can be calculated after taking into account the price and facility for securing different ingredients.

Wet Mash
1 lb. potatoes
1 lb. middlings
½ lb. bran
½ lb. meat meal

Grain Feed
5 lbs. oats

Dry Mash
1 lb. bran
1 lb. middlings
1 lb. maize meal
1 lb. clover meal
½ lb. ground oats
½ lb. fish meal

Grain Feed
5 lbs. wheat

These feeds give an approximate ratio of 1 to 4.1 for the wet mash, and 1 to 4.9 for the dry mash, which is sufficiently accurate for practical purposes. In bad weather to provide more heat one pound of maize could be given, in place of an equal weight of oats, with the wet mash, while in the dry mash in mild weather half the maize meal could be replaced by middlings.

CHAPTER IV

POULTRY FOODS

ONLY by constantly handling feeding stuffs can the skill and judgment which are essential to economical buying be acquired. It requires considerable practice before the poultry-keeper learns to distinguish the good from the bad samples amongst the great variety of both individual foods and proprietary mixtures on the market.

MIXED GRAINS AND MEALS. It can be taken as a general rule that mixtures are expensive to buy, and it will pay the poultry-keeper better to get into the habit of mixing the ingredients himself. If a mixture is desired it can be quite simple, and the ingredients can be purchased separately and mixed at a much lower cost than the market price of the mixture. Added to this, it is far more difficult to detect worthless or even harmful substances in a mixture than in individual foodstuffs, so that the buyer is more liable to be defrauded at the hands of unscrupulous vendors. In the majority of cases some inferior material is used up in this way.

Dry Chick Mixtures are a particularly expensive form of feeding, and large quantities of useless and unnecessary seeds are included in many of these. *Dry mashes* lend themselves even more to unfair charges.

There may at times be difficulty in securing any particular foodstuff, but the poultry-keeper should seek substitutes of similar chemical composition.

WHEAT. Small and damaged wheat or tailings which are useless for milling are actually better for poultry feeding than best samples of the grain. In comparison with oats, wheat is relatively deficient in fats, and the former is preferred as a staple food for adult poultry, but wheat is better for young birds because of its lower fibre content. If properly matured it is a very safe and valuable food for all classes of poultry.

BRAN. The outer covering of the wheat grain, *bran*, contains a large percentage of indigestible fibre, but the high proportion of proteid and ash makes it an exceedingly valuable food. Bran forms the basis of all dry mashes and is a fairly general ingredient in wet mashes, but is a laxative when wet, and is not recommended for young chickens in this condition. The quality is very variable: the coarser bran, such as supplied from stone mills, is more valuable for poultry-feeding than that from roller mills.

MIDDLINGS. This is known by various names in different districts, and is the residue from wheat in the milling of white flour. Samples vary greatly, and in some districts there is no distinction between sharps (fine bran) and middlings. The very finest quality of middlings, "biscuit toppings," is the best value, but more fattening, and for laying hens should be mixed with a larger proportion of bran than usual. It will be seen by the table (p. 26) that middlings contain much less fibre than bran, and can be freely used in wet mashes, and it is the most valuable food we have for all purposes of poultry feeding.

OATS. Stout, hard oats of good weight (not less than ten pounds to the peck measure) should be purchased for poultry. Grain is now sold by weight, and the actual weight by measure is only given for a guide to quality. Clipped oats will frequently weigh forty-six pounds to the bushel measure if of good quality, and these are recommended for their reduction in fibre content. Both in ash and fats oats are a particularly valuable food.

Sussex ground oats are a noted poultry food, used largely for fattening and in chicken rearing, and to a considerable extent replacing barley meal. Crushed oats are different altogether. Ground oats include the husk of the oat and a small proportion of barley ground to a fine meal. Adulteration is common, and the prices charged in some districts exorbitant.

OATMEAL. This is unfortunately sticky and unpalatable for poultry when cooked, and in a dry state is liable to cause digestive trouble. It would otherwise be more freely used for chicken feeding. Coarse oatmeal or groats are highly valuable in moderate quantities, and fine oatmeal in a dry mash for chicks.

MAIZE. Maize is pre-eminently a heat forming food, and as such is particularly valuable for birds kept on heavy wet soils or in cold districts. It is preferable if cracked, and should generally be fed with either wheat or oats in the proportion of 1 to 3, increased to 1 : 1 when conditions are particularly cold or unfavourable.

Small chickens do not take to cracked maize as readily as to wheat, but it is good for them in a mixture.

MAIZE MEAL. This is valuable in wet and dry mashes. In the wet mash it is better if scalded with bran to secure a proper consistency, and should be given with middlings to little chicks if ground oats are not available.

For fattening, a proportion of 1 : 3 is recommended; if exceeded, the fat is inclined to grossness.

MAIZE GERM MEAL. Chiefly a by-product in the manufacture of corn-flour, it contains a high proportion of oil and should be used with caution.

At the present time the maize feeds are difficult to obtain, but it is anticipated they will be more largely used in the future.

BARLEY. With more fibre than wheat and less oil than oats, barley is only used for affording variety. The meal is useful in moderate quantities and valuable for fattening, but is not recommended for small chickens.

PEAS AND BEANS. Both these are deficient in fats, but very rich in albuminoids. For variety their use is recommended for adult fowls, chiefly in meal form, care being taken to balance the ration. Peas are an excellent food for turkeys, with an equal amount of maize.

DARI, ETC. If of good sample, *dari* is equal to wheat, but not easily obtainable. *Canary seed* is highly valued for chicken feeding. *Hemp* in small quantity in mixtures, and *Buckwheat* of good quality to afford variety.

LINSEED contains about a third of its weight of oil and of albuminoids, and is valuable to aid feathering; but a proportion of five per cent. in a mixture is considered the maximum amount advisable.

RICE. Rice is very deficient in albuminoids, but this can be made good by addition of meat foods; without this addition chickens reared on rice would be soft boned, but it is a particularly valuable food as a corrective for bowel disorder. The best polished samples are not as good as the cheap chicken rice as a rule. *Rice points* can, at times, be secured very cheaply, and they form a very suitable food for fattening. It is always better to cook rice for poultry feeding.

MALT CULMS AND BREWERS' GRAINS. These by-products of the brewery are bulky and rich in albuminoids. Malt culms are highly digestible, and a valuable economical food for laying hens. They should be scalded and used in a wet mash, and will be readily taken when the birds become accustomed to them. A proportion of twenty per cent. can be recommended in the mash. *Wet grains* are to be preferred to *dry grains*, but are only easily obtained when in the proximity of a brewery, and are generally sold in large quantity.

FRESH MEAT AND BLOOD. Meat offal and horse-flesh, if obtainable, are valuable foods, and generally very economical. *Fresh meat*, such as bullock's liver and lights, which can be finely chopped, is of great advantage to young chickens. Meat should always be cooked before feeding. *Blood* can, at times, be secured from a slaughter-house for a very small consideration; this is preferred cooked and the clots chopped up, and is good food for adult birds.

MEAT MEAL. Meat meal requires scalding and standing a short time before feeding in a wet mash, or can be added to the dry mash without further preparation. As a result, it is less trouble to use than fresh meat and can be employed regularly. Samples vary very considerably, and are difficult to judge. At times much refuse, hard bone, and wood can be detected. These are useless and sometimes dangerous. As an instance of the variation in meat meal, two samples from the same firm were analysed within a few weeks. The first showed seventy-two per cent. albuminoids, thirteen per cent. fats, and the second thirty-four per cent. albuminoids, ten per cent. fats. A guarantee of the analysis should always be asked for; in the case mentioned, the guarantee, in both instances the same, was below the result of sample No. 2.

FISH MEAL. The use of fish meal for feeding poultry and all classes of farm stock has greatly increased. This is a most valuable food if of good quality, but considerable losses have recently been experienced, caused by fish meals containing salt in excessive quantities.

Four per cent. of salt is the maximum proportion admissible, and not more than five per cent. of oil is desirable.

Some objection is raised to fish meal on the score of its flavouring the eggs, but this is mainly prejudice; if used with moderation there is no disadvantage on this score.

From ten per cent. to fifteen per cent. is a suitable proportion for general use.

GREEN BONE. While freshly cut green bone is valuable for egg production, this should be used in moderation: 2 ozs. per bird, spread over a week, is considered a sufficient quantity. For young growing stock strictly limited quantities of the best soft bone free from splinters is valuable for its high ash content. Stale bone is dangerous. *Bone meal* cannot be recommended, samples of this having been found very unreliable.

BISCUIT MEAL. This is a convenient and useful food for wet mashes, but should always be freshly prepared, scalded, and only allowed to stand a short time before it is fed. For adult fowls twenty-five per cent. is a suitable proportion, mixed with bran and meals. Frequently too large a quantity is used, and since this is an easily digested concentrated form of food, it is apt to fatten the birds.

Flaked Maize and similar foods are most useful for wet mashes, but there has been a great tendency to over-value these since they have increased in popularity.

Green Vegetables and Roots. All classes of green vegetables are highly valuable for poultry feeding. Of the roots, swedes and beet are most useful; mangels should be used with moderation. Potatoes have been much condemned for poultry-feeding owing to their use with fattening meals, such as those of barley and maize. They are, however, a most economical food in many instances, and if the ration is properly balanced with a due proportion of bran and meat food, they can be recommended. Artichokes are much appreciated by fowls, and a useful food either cooked or in the raw state.

CHAPTER V

HOUSES, SHELTERS, RUNS, AND GENERAL EQUIPMENT

WELL planned equipment leads to great saving in labour, while makeshifts add to this, are an unnecessary trial of patience, and frequently lead to losses among the stock.

There are many details in the planning of houses, runs, and different appliances of which experience will teach the value. To mention a few: *Extra height* in the house for the comfort of the attendant leads to better cleaning. The fixing of a *door* for entry to the house outside the pen facilitates attendance to trap nests, and collecting birds. Simple effective *catches* which cannot get out of order in place of hasps and staples which need two hands to fasten. An arrangement should be made for *water vessels* to be cleaned and filled without entering the pen. A *brooder* should be chosen which is easy to move, has reliable lamps, and is simple to attend to. These and many more similar details lead to economy of labour; often a few extra shillings expended save pounds in other directions.

PRINCIPLES OF HOUSING. Many a house of rough-and-ready appearance is admirable when the principles of housing are properly carried out. It should be remembered that the fowl is a highly sensitive organism. The normal body temperature is 2° higher than in mammals; respiration and digestion are more rapid; moreover, production from the laying hen has reached a stage when under correct management prolific strains will produce five times their own body weight in the course of twelve months. It can readily be understood that good conditions are needed to secure such a result.

LIGHT. In the planning of poultry-houses great attention must be paid to adequate lighting arrangements. Good lighting is equally important both in the roosting houses and in the scratching shed. Where the light is deficient the houses will become foul, and ill-health among the birds will follow.

In spite of its seeming extravagance, the use of glass is strongly recommended, because it affords at one and the same time plenty of light, freedom from excessive ventilation, and protection from driving rain and the dampness of the air. Canvas shutters subdue the light to too great an extent and are not nearly so durable as glass. The front of the poultry-house should be fitted with glass, and this is better if so arranged that it can be easily removed in the summer weather.

Side lights are better than top lights; with the latter extremes of cold and heat are felt more, and in the winter time, when a shelter is most used, the sun is low and more light will be caught by side windows, although where deeper houses are used top lights are an additional advantage. Only poultry-farmers on a very large scale are concerned with the use of artificial light, and its economic value is not definitely established.

VENTILATION. In the old type of fowl-house so much attention used to be paid to ventilation that the houses were draughty. Many of the newer types have erred in the opposite direction, and even in open-fronted houses the air is found to be warm and fetid after the birds have been some hours on the perch, especially in houses with lean-to roofs. Excess and lack of ventilation both lead to colds and roup, stuffiness more so than draughts. A bird roosting in the open will face the wind and so be protected by its feathers; therefore ventilation in houses should be so arranged as to exclude direct draught on the birds.

Open fronts have much to justify their popularity, but lean-to roofs, which have largely taken the place of the apex roof, are not so sound an innovation and are frequently defective in ventilation; a three-quarter pitch, a compromise between the two is preferred.

Ridge ventilation, or ventilators which can be open or closed as needs dictate, are recommended in addition to the open front. These should be either at each end at the highest point in a pitch roof, or at the back.

The trouble of attending to these ventilators is nothing compared to the work and loss attending roup. A minimum of ten cubic feet of air space per bird in the roost-house should be allowed.

DAMP. The offensive smell of a damp fowl-house is well known, and it is aggravated in all cases where the manure and litter on the floor become damp. Dampness will ultimately have a bad effect on the stock. The necessity for sound walls and roof is generally understood, but soundness in the flooring is often overlooked.

In excessively damp atmospheres additional protection of the open front is needed at times. A canvas shutter hinged at the top and fastened back to the roof on the inside during the daytime is a most useful addition for this purpose.

CLEANLINESS. Ease in cleaning is an important point to consider in planning a house. Superfluous fittings only harbour dust and vermin, and all the necessary fittings should be made to remove easily, leaving only the base walls for periodical inside scouring.

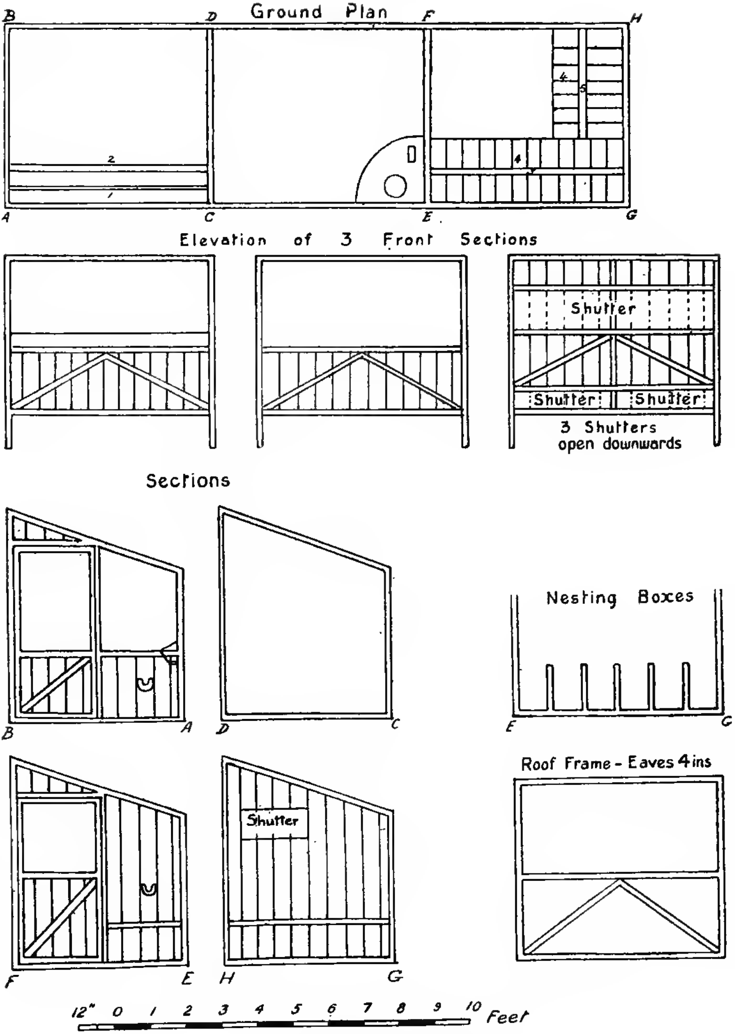
OPEN-FRONTED HOUSES. For the semi-intensive system in the open, a combined roost and scratching shed is best. Sometimes economy in material can be effected by building a scratching shed on to a garden wall or fence with the roost as a separate compartment.

For a combined house of this type square buildings are recommended up to ten feet side. Above this size the *depth* should not be increased by more than two feet for every additional ten feet in length, up to a maximum of forty feet by sixteen feet ; but a depth not exceeding twelve feet is preferable.

In long houses divisions from floor to roof must be placed at about every ten feet, and project for not less than seven feet from the back of the house. Without such divisions the perches will be in a draught. In the deeper house the distance apart and projection can be increased.

The roof requires a fall of six inches in every two feet to carry off the water properly ; thus with a house twelve feet in depth the roof of lean-to pattern will require to be higher than if a pitch roof is used.

The additional height in the "lean-to" is of no advantage as the front is more exposed, this requiring either a broader weather board or additional glass in the front. The height of the front must be from five to seven feet according to depth, and at the

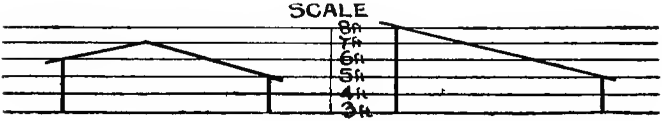


PLAN OF INTENSIVE HOUSE

See Chapter I.

back of the house, at which the perches are generally placed, a minimum height of four feet six inches is necessary.

Wooden floors raised off the ground are drier and more healthy. The extra expense of these is amply compensated for by their superior advantages. With the flooring a moderate height from the ground, a cat or terrier can get beneath and prevent rats lying up under the floor. When this is higher still, the space underneath is valuable in summer both for shade and as a place for dust baths. During bad weather this space should be netted off to prevent the birds huddling beneath the house.



PLAN OF ROOF

Concrete, tar-ash, and beaten earth floors lack these advantages. Concrete often strikes cold and damp; earth floors become uneven with the scratching of the birds, and are not rat proof.

An earth floor has the merit of cheapness and is best made in the following way:

Raise the house off the ground by bricks placed under the frame at intervals. Next cut a narrow trench round the inside of the frame and place in it rough boards, nine inches by one inch, which have been previously tarred. These should fit tightly against the frame with the top of the board level with the top of the frame. The boards will then be several inches below the outside ground level. The ground inside the house should be beaten hard, and it is an advantage to raise the floor with the addition of earth or gravel.

Earth floors are useful in place of wooden floors for small houses which only remain on one site for a short period, and when concrete or tar-ash would be out of the question.

PORTABLE HOUSES. The term "portable" is applied to houses which can be wheeled or carried about at will; these should all have wooden floors. They are only suitable where the land available is sufficient to warrant frequent removal. As a rule portable houses should not exceed nine feet by six feet; large houses are unwieldy and apt to be damaged in transit over rough ground. A house six feet by four feet with a pitch roof giving a mean height of five feet is the most useful size; this is capable of accommodating twelve to fifteen adults, or twenty to thirty young birds. It can be easily moved without a horse, and frequent removals will benefit both the birds and the land, which is thus kept free from bare patches. The small flock accommodated is an advantage as the birds will thrive better in limited numbers.

With a view to saving labour in cleaning, wheeled houses are sometimes made without floors, being fitted with an arrangement by which the house is lowered off its wheels directly on to the ground. The absence of flooring-boards results in a lack of rigidity, and the house speedily racks to pieces. Moreover, the floorless house must at certain times be placed on wet ground, which makes a bad floor and causes subsequent discomfort to the birds.

The use of droppings boards in a portable house is to be advocated; clean, dry litter can then be kept on the floor, adding to the comfort of the birds and preventing the eggs getting so dirty.

The arrangement of the perches in many portable houses is very unpractical. On opening the door a row of perches face the attendant, and to catch a bird or collect eggs at the opposite end of the house he has either to climb over the perches or remove them altogether. The perches should run lengthways.

The laying boxes, too, are often placed in quite the wrong position ; the hen has to cross the whole length of a dirty floor to reach her box : this means a large number of soiled eggs.

INTERIOR FITTINGS OF THE HOUSE. The arrangement of these is worth careful, keen consideration. With a permanent house and scratching shed the *perches* should be at the back.

The smaller houses should have droppings boards, which are also to be preferred in the large houses, but can be dispensed with in favour of a pit beneath the perches.

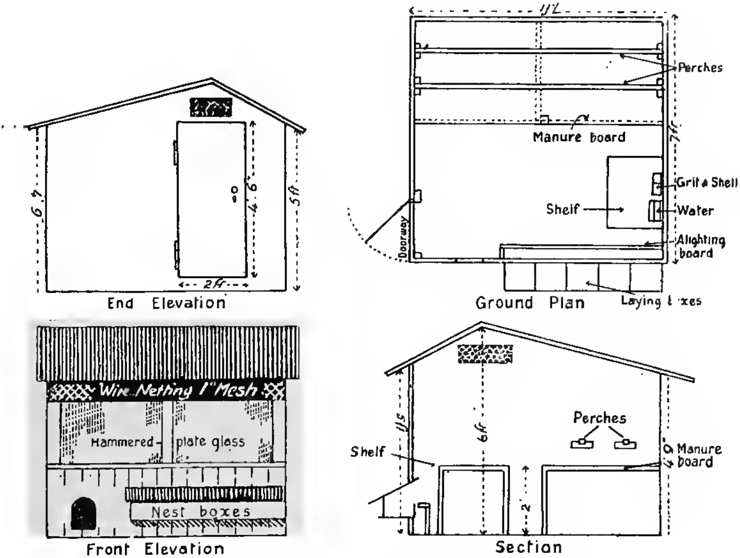
Both perch and dropping board should be removable, the board resting on brackets two feet above the floor and the perch not less than six inches above the board, twelve inches being recommended if head room permits. The droppings board should project two feet three inches from the back of the house, or in the case of two parallel perches, not less than three feet.

Perches two inches broad with rounded edge are the most suitable size. If branches or poles are used, no bark should be left on these in which red mite could harbour.

Nest Boxes must not be less than twelve inches square, twelve inches high in front, and eight inches at the back, and for trap nesting a slightly larger size is an advantage.

It is most necessary to pay attention to the ventilation of trap nests; suffering to the birds and loss to the owner may follow if this is overlooked, especially in the case of outside nest boxes exposed to the sun. The boxes are generally better raised from the floor and placed in the least noticeable position. In order to avoid egg-eating habits being contracted, these are best placed where little light will enter, exposing the egg after the hen has left the nest.

Water Troughs are better kept in the outside run, but if necessary to have these inside the house, a platform should be provided for the purpose well



End Elevation

Ground Plan

Front Elevation

Section

PLAN OF SEMI-INTENSIVE HOUSE

above the ground to prevent dirt and litter being scratched into them by the birds.

The same applies to *food troughs*, which should not be fixtures.

The practice of suspending a cage for broody hens in the interior of the larger laying houses though convenient is not good. The most useful and economical contrivance for the purpose is an outdoor fattening cage.

PENNING. A guide to the number of fowls which can be allotted to the acre under the semi-intensive system has already been given.

Fixed Pens. A permanent breeding pen to hold twelve hens and a cock needs to be twelve yards by twenty yards. Even permanent pens are better freed of birds for a short period during the moulting season in order to freshen the ground.

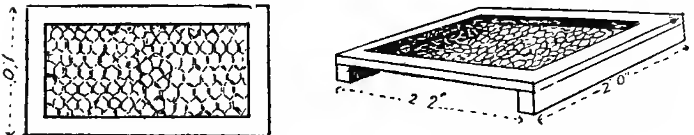
Alternate pens for small flocks cannot generally be advised because of the extra expense in netting and inconvenience in cropping a small pen. It is a better alternative to move the netting every two years and to erect it with the view to this being done so that only a portion of the netting and posts need be removed, the house remaining in the same position.

Posts two inches by two inches, seven feet six inches in length, should be used to carry six foot netting. This length is sufficient in heavy soil, while in light soils and exposed positions an additional six inches will be worth while. The longer posts are also better at corners. The posts should be placed at every three yards and driven in to allow two or three inches above the netting.

The smaller breeds of fowls require netting six feet high. One or two strands of ordinary wire are at times needed stretched above the netting to keep the birds within bounds. Much depends upon the size of the pen and the attractions both within and without. With a few trees or bushes, a hollow, or a mound, the pen is far less monotonous and for breeding pens such additions are most desirable, having good effect upon results.

Four foot netting will often prove sufficient to keep birds of the heavier type in an attractive pen of this description.

Wind Breaks two feet in height round the pen are an advantage both for shelter and to keep neighbouring cocks from fighting, but considerable expense attaches to this, and it is extremely doubtful whether it is worth the cost; the money may be better expended in other directions.



Sides in 3 pieces.

Roof showing battens to overlap sides and to hold these rigid.

FRAME RUN IN 4 SECTIONS

Made with 2" × ¾" batten, and ½" mesh netting. The sides should be hinged or tied to fold and pack away.

Chicken Runs. Fixed runs for small chickens are seldom as useful as the portable type, and a great deal of time is wasted and material spoilt with makeshift pens of netting placed round coops and brooders. Solid runs with wood frames do not stand much wear and tear owing to their lightness, and they are difficult to store.

The most practical plan is to have light frames or hurdles of standard sizes and to suit coops and brooders with netting of one inch mesh stretched over them. Three such frames will form a run in front of the coop or brooder, the corners being tied or hinged. The netting can be stretched over three sides so as to dispense with hinges. The two sections of the top overlap the sides, gripping them and forming a strong rigid run with the brooder exactly fitting into the opening. The entire run is in sections, and takes up but little storage room.

Temporary pens placed round houses for birds out in the fields can be very conveniently made with ordinary sheep hurdles covered with netting. Pens of this sort are necessary for a short time after birds have been placed in new quarters until they have become accustomed to the change.

Construction and Material. In spite of the slight increase of material and labour involved it is better to have all the houses except portable ones made in sections that can be bolted together. The extra expense of such a house will be more than compensated for by the increased value, in the event of a sale, and the ease with which the houses can be moved from site to site, or taken to pieces for disinfection.

Frames. Strong frames are the first consideration, and the weight of the wood used will depend upon the size and type of the house. Framing is sold by the foot run, the size ranging from two inches by one and a half inches to four inches by two inches.

For permanent houses, lightness is of less consideration than for portable. In a house ten feet by ten feet, for uprights, bottom sills, and floor supports, timber three inches by two inches will be necessary, while for the rest of the frame two inches by two inches will be heavy enough. For small houses, two inches by two inches and two inches by one and a half inches will suffice.

The strength of portable houses depends a great deal upon the making of good joints. Joints made without unduly weakening the wood are desirable, although they add to the cost of construction. The frame is meant to hold the boards together and not the boards the frame, as might appear from some houses. For coops, frames for runs, and similar small articles, battens of two inches by three-quarters of an inch section are used.

With a little experience the poultry-keeper can make his appliances at home more cheaply than he could buy, and, in addition, turn out a pattern better suited to his requirements. The work can be done in odd time and is of great interest. A skilful amateur carpenter will save many pounds in an outlay on poultry appliances, but if not capable of this work it is well to remember, when purchasing, that the best is generally the cheapest in the long run.

Before the construction of a house is undertaken, plans should be carefully made and the cost estimated. The material should then be purchased in lengths of about the size required for the different parts; this will save much time and material.

Boarding. This is purchased by the square foot. Match boarding generally runs from four and a half inches to seven inches in width, and from half inch to one inch in thickness. Ordinary boarding and weather boarding can be obtained broader and thicker.

Five-eighths inch match boarding is the lightest that can be recommended for any purpose, and for large houses seven-eighths or one inch thickness is necessary. Match or weather boarding is generally used for the walls, while for roofs and floors ordinary boards will suffice with a covering of felt for the roof.

Many a good fowl-house has been built with wood from empty cases, and this material is far less costly. Cheap sources of supply are frequently overlooked.

Asbestic Sheets. The use of this material for poultry-houses is on the increase. It is claimed to be both warm in winter and cool in summer, and while in the writer's experience wood is much to be preferred, the former material is suitable for fowl-houses and has certain advantages.

The sheets are sold at so much per square foot, in eight feet by four feet, and six feet by four feet sizes. Owing to the size of the sheets there are few crevices for the harbourage of insects and less time is taken in erection. The material is not *cheap*, requires careful handling, and is more fragile than wood. Heavy blows will crack the sheets.

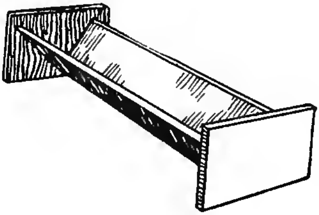
Galvanized Iron. Except as storage sheds the use of iron is not recommended except with a board lining. It may be used on the roof in place of felt, provided a space is left between this and the boards for ventilation. It is important to note the desirability of painting iron to prolong its life.

Felt. A number of good houses mainly constructed of felt have come before my notice. Without personal experience in the use of these little can be said. That a sheltered position is needed and a short life to be expected is clear.

For the roof of a house felt above the boards is an economy. The rougher felts, if thoroughly well tarred for two or three seasons in succession, will last a long while. It is not sufficient to merely brush the tar over : a thorough soaking is required. Prepared felt is cleaner and less heavy for coops and brooders, but usually needs a further coat of tar if it is to last any length of time.

When secured to the roof by battens, it is necessary to first tar the felt beneath these. With this method of fixing there is less danger of damage from high winds getting beneath and ripping the felt than if nails only are used.

Nails. Oval wire nails, one and a half inches to two inches in length, are recommended for fixing the boarding, screws, or light iron nails for the frames, and one and a half inch wire nails bent over for fastening netting are better than staples.



FOOD TROUGH

Such things as *feeding troughs* and *dry mash hoppers* are best made of wood. These should be simple in pattern, designed to secure cleanliness, and to avoid waste of food, V shaped feeding troughs four feet to five feet in length are a useful size for wet mash for a pen of twelve fowls.

Many designs of *trap nest* are good, simplicity in working with nothing to get out of order being the chief aim.

It is an extravagance to buy these articles except as patterns, unless large numbers are required.

Glazed earthenware *drinking troughs* prove the most useful and economical for the larger birds; while for chicks, shallow glass jars with an inverted bottle make an inexpensive drinking fountain.

While a good and adequate equipment is advised, a warning should be given against elaborate and unnecessary appliances; with a little thought and ingenuity much money can be saved.

CHAPTER VI

THE SELECTION OF LAYERS AND BREEDING FOR UTILITY PURPOSES

THE grading of the laying stock and elimination of the poor quality, unprofitable specimens are of very great importance to all poultry-keepers. Two or three bad layers in a small flock will pull down the average profit to a considerable extent, since these birds consume no less food than the others.

CULLING. This " culling " of the flocks is rightly receiving great attention, and when poultry-keepers, particularly those on general farms, realize the value to themselves of sorting out and disposing of the unprofitable birds, they will pay greater attention to learning the points which indicate a good from a bad layer ; a definite step will then be made towards more economical production.

While " culling " can go on all through the year, and individuals which appear no longer profitable to keep killed off for home consumption or odd sales, there should be a systematic sorting at certain seasons. September is about the best month to go through a flock of layers, when the majority of the hens which are over two years of age, a proportion of the younger hens, and probably a few pullets can well be dispensed with in order to leave more room for the remainder. Apart from making a considerable reduction in the winter food bill, which the poor layers will never repay if kept on, the extra space and attention which it is possible to give the remaining birds will result in a still better return from these. The poultry-yard is frequently too overcrowded for securing the best results.

SELECTION OF LAYERS. The details here set out as a guide to selection become simpler with practice, and although careful study of these will help to teach him more quickly, the poultry-keeper will find that when selecting his fowls he will not need to go round with a tape measure any more than when feeding will he require to sit down and work out the albuminoid ratio before altering the diet. Undoubtedly, theory is of aid to the practical man and with practice the work becomes instinctive.

The first judgment of a bird is often sufficient. Generally, a few birds in a flock are outstanding either as good or bad specimens, but although appearance goes some way to indicate the laying character, the temporary indisposition of a bird, such as may be brought about by moulting or broodiness, will easily lead to a false judgment, and handling is very necessary in making a selection.

Head Points. The head should be small and neat. The comb, wattles, and ear lobes, of medium size, well proportioned, and fine in texture. Eyes bright and prominent. Beak strong, well curved, and of medium length. The neck should be slender and well arched.

Body Points. The body should be of medium size for the breed; the "wedge" shaped form is best for a laying hen. A broad back, with depth from this to the lower part of the abdomen, is desirable.

The breast bone, of medium length, should leave ample space between its point and the pubic bones, situated below the vent. This space across the abdomen is generally termed the "capacity," and is one of the best guides by which to select a layer. Measurement is taken by placing the fingers across the space; in the case of a Leghorn or Wyandotte, a breadth of four fingers indicates the best layers, but it must be remembered that breeds vary considerably, and the general size and character of the breed must be taken into account, comparison being made with individuals of the same breed.

The pubic bones should be fine in texture, and if felt between the finger and thumb will give some indication of the general fineness of bone which is desirable in a layer. These two bones should be set well apart. When the bird is "in lay" they will be still wider apart and the "capacity" measurement greater.

Plumage should be bright, feathering close and not too heavy, and the wings carried well up fitting closely to the body. The description "carried gay" is given to the best form of tail.

The skin should be soft and silky to the touch.

Legs. Fine in bone, and of moderate length, the legs should be straight and set well apart; the scales should be small and close fitting, toes straight and of medium length with short, strong claws.

These points apply equally in selecting a bird in its first, or pullet, year, or the second year as a hen, but at the conclusion of the first laying season other features are noticeable.

The legs of a breed ordinarily yellow in colour become bleached after heavy laying. Loss of feathers on the skull frequently takes place in a heavy layer, although the best layers do not always exhibit this bareness.

Late moulting is a particularly useful characteristic of a good layer. Birds which moult early should be weeded out to make more room for pullets, for the former will probably cease to lay while moulting, take a long time over this process, and are generally indifferent layers. On the other hand, a bird which moults late in the autumn will benefit by the rest if she ceases to lay then, and be of greater value for breeding in the following season.

There are no definite means of telling the number of eggs a bird is capable of laying, and it is only necessary in "culling" to judge whether the bird is likely to prove a good, moderate, or indifferent layer. In this connexion it is worth remembering that a good hen badly managed is less profitable than an indifferent one well managed.

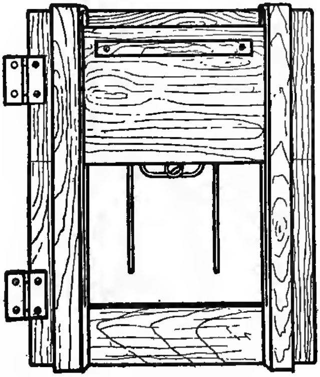
Trap Nesting. Although a slow and laborious method of selecting layers, trap nesting is a sure way of grading them for further retention and breeding.

The trap nest teaches more about the individual hen than the actual egg production, and is an essential part of the work of the best breeders.

Differences as regards vigour, temperament, and habits are learned by handling the birds and observation of the laying chart; for this reason, if for no other, trap nesting should form an essential part in the practical instruction of a pupil. The manner in which this is carried out by him is a pretty good guide of his suitability to take up poultry production.

Recording should begin from the time the pullet commences to lay. A complete test covering twelve months is naturally of most value, but the expense of this by added labour or the neglect of work of greater importance may render it undesirable to record more than three or six months.

The recordings of the periods from October to January and January to April are the most valuable. The best layers can mostly be picked out after their first three months laying, and the second period will easily indicate the bad layers.



THE PERFECTION TRAP NEST

A simple and effective type of trap front

A definite twelve months' record has its advantage to the specialist breeder, for he is justly entitled to charge higher prices for stock supplied from the more carefully selected birds. It is, however, often a greater disadvantage to continue the recording when owing to trap nesting the pens cannot be cleared and the birds given the benefit of free range.

A bird which averages fifteen eggs per month during the first period, and twenty eggs per month during the first six months' laying, can be classed amongst the best layers. It is considered that a pullet should commence to lay at six months old; many will lay a month earlier, but this is seldom an advantage, since it will check growth and the eggs, small at first, may not increase in size with the age of the bird. The capability of a bird to lay steadily during the months of October, November, and December is important and a desirable characteristic to reproduce.

Trap nests should be made roomy, clean, and comfortable, and placed in a suitable spot to attract the birds. If the pullets are gently and quietly handled there should be no difficulty in ensuring the use of the nest. A record card kept on the wall of the house is better than entry in a note-book. There is less likelihood of wrong entry, and greater interest and confidence given to visitors to the yards if the records are on view. Numbered rings are placed upon the legs of the birds for identification. These are better than coloured rings, although the latter are useful, in addition, for identifying special birds when out on the run. The nests need to be frequently visited to release the birds, and prevent the risk of broken eggs through their restlessness at long confinement. It is well to make a practice of marking the egg with the bird's number and date of laying, and note should be made on the chart of broodiness, size, bad formation, or shell-less eggs, and other points of subsequent importance in selection for breeding.

Much can be gathered from a well-kept record. Continuous daily laying for a long period without a break is liable to impair the stamina of a bird, while the more steady layer of five eggs every seven days benefits by the break, and generally proves a better bird for the breeding pen. It does not necessarily follow that the most prolific layer will breed the best laying pullets; in many instances directly the reverse has proved the case.

THE BREEDING OF FOWLS. The poultry-keeper maintaining six to twelve laying hens which he desires to replace every other year, or whose accommodation is limited, is better advised not to attempt breeding. Not only are the conditions unfavourable with a small area devoid of natural advantages for the birds, but the expense of securing and maintaining a cock of the desired quality is not justifiable.

For renewing a small stock, sittings should be secured from some reliable breeder who makes it a special study and possesses the facilities for producing vigorous stock.

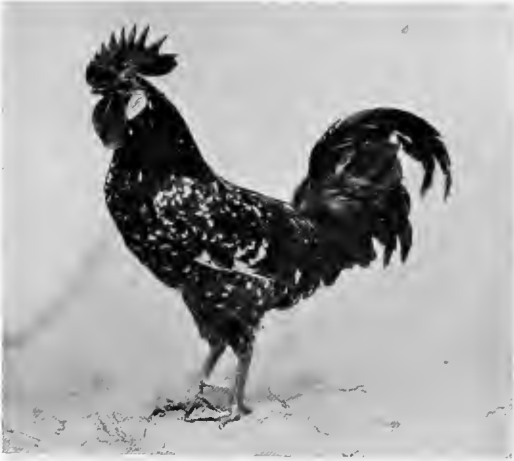
There is, of course, considerable attraction and interest in the breeding of poultry, and for this reason many will continue to breed from their own birds regardless of expense. It is an unfortunate sequel that sittings of eggs will be sold to others from stock bred in this way; this is not at all to the interests of the poultry-keeping community.

Something has to be said upon the other score. There are numbers of reliable poultry-breeders, but the amateur poultry-keeper has not always the opportunity of discovering them, and is prone to fall a victim to the many ignorant and unscrupulous people posing as such. A solution of this difficulty would appear to be in joining a utility poultry club, upon which members should be able to depend for suitable guidance.

Selection of Breeding Stock. Vigour is of primary importance. The exclusion from the pen of a bird that has ailed in any way is necessary; only those showing vigorous health should be used. Crooked breast-bones and twisted toes are signs of constitutional weakness. Lack of gloss in the plumage and discoloured combs are signs of ill-health. The whole appearance should be alert and active, with close, glossy feathering and firm muscular flesh.

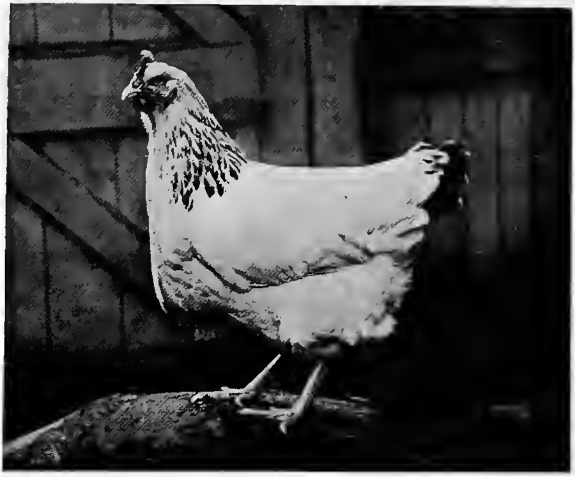
The cock is of greatest importance. He will be mated to from six to fifteen hens, according to the breed and the bird's age and vigour. There is no definite rule as to the number, but the maximum for a young bird can be taken as fifteen for a light breed of the Leghorn type, and ten for the heaviest breeds, such as the Speckled Sussex. If undermated the effect will be noticeable in the females, but it is worse to overmate as the damage to the male will not often be discovered until too late to be repaired.

The fact that approximately from two hundred to three hundred chickens can be bred from one male in an ordinary season, and that these may be expected to bear half his characters, will serve to impress the importance which should be attached to his selection. The laying powers of a pullet are as a rule inherited from the male parent; hence the necessity of securing a bird bearing this character inherited from his mother, and the aim of all breeders of laying stock is to secure a bird known to have been bred from a hen with a high laying record. To take it that the bird has inherited this character and the power to transmit it, is jumping to conclusions; many breeders fall into this habit



SINGLE COMB ANCONA COCKEREL

A SLIGHT, ACTIVE BREED, WHICH PROVES VERY PROFITABLE FOR EGG PRODUCTION



LIGHT SUSSEX HEN

THE SHAPE OF THIS BIRD INDICATES THE MERITS OF THE BREED FOR THE PRODUCTION OF TABLE POULTRY

and fail to attach sufficient importance to the older birds which have been tested and proved to produce highly fecund stock. The discarding of a bird at the conclusion of his first season and replacement by a young untried bird is often an error.

If the results of a mating prove valuable, it can be repeated another season, some birds lasting good for four successive breeding seasons, and in the meantime other birds are being tested. The pedigree of the male is no guarantee of his value for breeding, and while this should have due consideration, vigour and conformity to the points given for the selection of a laying hen should have equal attention. The quality of the bird becomes even more apparent after the first adult moult, when if still alert and vigorous, his increased maturity adds to his value as a breeder.

The cock should be very carefully looked after; special attention to feeding him separately is often justified. In his attention to the feeding of his flock the cock constantly suffers in condition. When a cock is to be kept for another season's breeding it is a mistake to isolate him in a small pen for any lengthened period. During the moulting season he will do best with a reduced number of hens, or may be kept with a flock of young cockerels so long as he remains the master bird.

The hens should be selected as far as possible for uniformity in size and type. Size is generally inherited from the female side, and birds of medium size for the breed should be chosen to produce layers and on the large side for breeding table birds. Small hens are frequently famous layers but less suitable for breeding. Larger and more vigorous chickens may be expected from hens (second year birds) than from pullets, provided these have been maintained in healthy condition.

The hen which possesses a good laying record—the approximate averages already given for the breed may be taken as a guide—has passed successfully through the moult, and laid few, if any, eggs before January, may be considered the best for breeding. The early hatched pullet that has laid heavily during the autumn is not in a condition to produce vigorous chickens, and it has frequently been noticed that late hatched pullets after only a brief period of laying will throw stronger chickens.

Management of Breeding Stock. The more natural the conditions under which the stock are kept the stronger will the progeny be, and greater vigour will be retained for perpetuating the strain. The poultry-breeder should look far ahead; it is regrettable to see the growing tendency to breed from stock kept under conditions the sole object of which is to secure heavy egg production.

When pedigree breeding, it is usually desirable to keep the birds in pens, but for producing laying pullets the breeding flock is far better placed on free range under semi-wild conditions. These conditions are ideal for breeding and should be followed where circumstances permit.

Feeding and management to encourage a well-fed but hard condition should be the object, the birds receiving no special inducement to lay until a reasonable period before the eggs are desired for hatching. The food may consist largely of good quality oats with small proportions of wheat, peas, and maize alternating to meet climatic conditions. Some soft food may be given, green vegetables bulking largely in this, and meat food in moderate quantity. No spices should be used. The birds should have their liberty in all weathers, with reasonable shelter provided in a clean house. Some inducement to exercise by the manner in which the grain is fed is needful to keep the birds in good condition in bad weather, and even though on free range without a scratching shed, a heap to litter in the open will provide this.

Infertility may be due to the fat condition of a bird or to underfeeding the male. The spurs of a second year bird frequently require paring, this should be carefully done to avoid hurt. Dubbing of the large combed breeds is frequently practised with advantage. With heavily feathered breeds, such as Favorelles, removal of the tiny feathers round the vent, and in the case of the Houdan the clipping of the top-knot feathers, is recommended. It is always well to dust the birds with flowers of sulphur during the spring months to free them from body parasites.

IN-BREEDING. While the term " line breeding " is often used this is nevertheless in-breeding, and should consequently be approached with the greatest caution. In skilful hands there is much in favour of line breeding for the specialist breeder, but its more common abuse by inexperienced people is likely to lead to disasters. It is out of place in a book of this sort to attempt to indicate the extent to which in-breeding may be practised, and this should be left entirely to the already experienced breeder. Many of our strains are very closely bred, and there is less danger of spoiling the utility characters of a strain by the introduction of fresh blood—with so many good strains of the popular breeds from which to choose—than by in-breeding with the risk of losing vigour.

It is common knowledge that some exhibition strains have been in-bred for twenty or thirty years and that the progeny appear vigorous; but it is a less known fact that at certain stages in growth great weaknesses are shown. Very different measures are adopted in rearing; greater attention is given to the smaller proportion raised, and the useless specimens produced being a small loss to bear when a few champion birds are reared.

The introduction of fresh stock from a distance is much to be advocated, birds coming from Scotland and the North of England to the eastern and southern counties have been found to give exceedingly good results. Poultry-keepers need pay more attention to the results of breeding, particularly in such matters as may reduce the heavy mortality which prevails among young chickens of the highly fecund strains. Great advances have been made in the breeding of fowls for useful purposes, but many problems await solution which are of very great importance, but entirely beyond the scope of the purely practical poultry-keeper.

CHAPTER VII

EGGS

THE value of the egg in the human dietary, and especially as a food for children, has been increasingly recognized of late. The decrease in imports and consequent shortage of eggs has led to large numbers of people keeping a few hens, and to many others taking up egg production as a means of livelihood. There can be no question that this is a far more profitable side of poultry-keeping than the production of table birds, and that the main attention of utility poultry-keepers should be directed to the production of eggs and of the hens which are most prolific for this purpose.

STRUCTURE OF THE EGG. The *shell* is composed chiefly of carbonate of lime. A brown shell is usually thicker and stronger than a white one, but variation is also due to the individual hen, her powers of construction and ability to secure the necessary material. A strong shelled egg is desirable, for it keeps longer and travels better. All the heavy breeds, with the exception of the Dorking, produce a coloured shell, while the light breeds lay a white-shelled egg. The shell is porous and allows of evaporation when exposed to the air, and entry of air into the space which lies between the shell and the membranes surrounding the yolk and white.

A *membrane*, or skin, lies immediately beneath the shell, followed by a second membrane surrounding the white. The air space lying between these at the top of the egg is no larger than a threepenny piece when the egg is just laid, but increases in size when the egg is exposed to the air.

The *white* of the egg is almost pure albumen. This is formed in layers of varying density; two thick ropes of white (the chalazæ), arising on the surface of the yolk on opposite walls, lie across the layers of white securing the position of the yolk in the centre, yet allowing it to revolve.

The *yolk* of a new-laid egg is perfectly spherical and firm, and is enclosed in a fine membrane (the vitelline membrane). Under this membrane lies the *germ-cell,* a small opaque spot on the uppermost surface of the yolk, and present in all eggs whether they have been fertilized or not.

DEVELOPMENT OF THE EMBRYO. A brief outline of the development of the embryo chick is of interest to the poultry-keeper. The egg contains the necessary material in the white and yolk for building the embryo. Development commences before the egg is laid, and then is checked until the necessary heat is again supplied. The cell then increases in size, the embryo lies in the centre, and from this blood vessels spread out upon both sides round the yolk until this is enveloped by a complete vascular system.

If a portion of the shell is removed on the third day of incubation, the beating of the embryo heart and the coursing of the blood through the minute vessels will serve to demonstrate to the observer the need for care in the treatment of hatching eggs.

Nourishment for the growing embryo is gained by absorption of the egg contents. From the fifth to the twelfth day of incubation the embryo is passing through the most critical stages, by the end of which time all the organs have been formed. By the nineteenth day only the chick and the yolk sac remain, and before hatching the yolk is entirely absorbed through the navel together with the blood. The dried-up blood-vessels will be seen adhering to the shell membrane after the chick is free.

KEEPING EGGS. Owing to the porous shell deterioration commences as soon as the egg is laid; this can be affected by strongly smelling substances. The need for careful keeping is insufficiently recognized; eggs become tainted in dirty nests or by the smell of groceries, and should not be kept near any substance likely to contaminate them. Placed in a clean dry case, covered to check evaporation, and kept at a temperature of 40° F. the eggs will remain in good condition for a considerable time.

Unfertilized eggs keep very much better, and for this reason no cock should be kept with the laying hens unless the eggs are wanted for hatching.

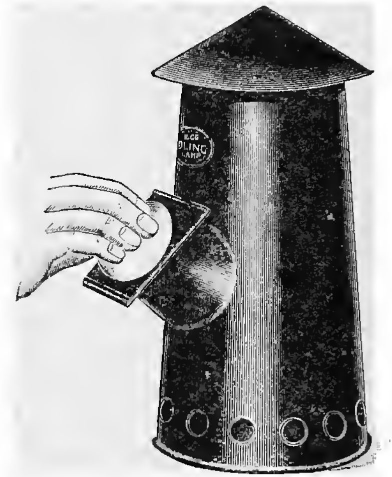
Eggs required for hatching are best kept in boxes made to hold sittings, the box being closed, placed on its side, and turned daily.

When dealing with large quantities, a rack with drawers for each day of the week is most useful, the date of the egg thus being registered without placing any mark on the shell.

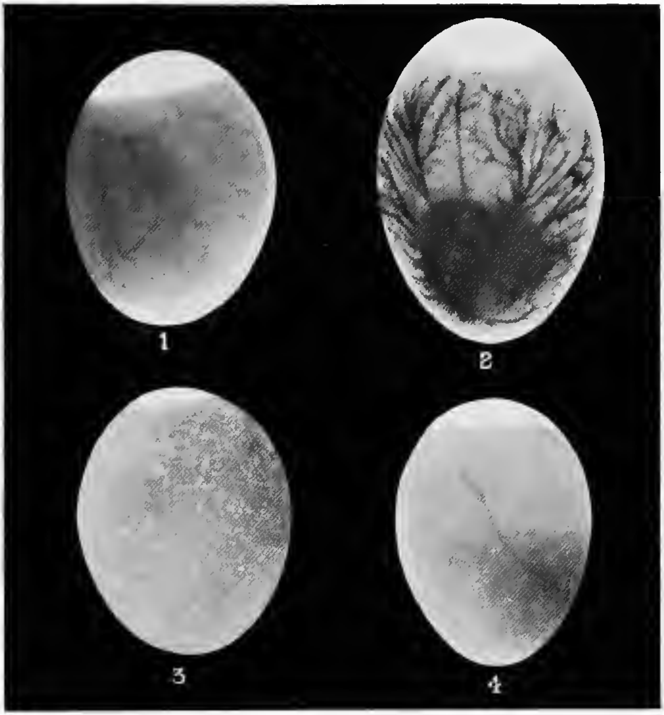
CANDLING EGGS. Eggs should never be sent out to a customer unless the quality is assured, and when a nest is discovered or eggs have to be secured from an outside source to make up an order, these should be candled.

Candling, or testing an egg for freshness, is a simple matter. Special lamps can be bought for the purpose, but the testing can be easily done with any strong light, shaded to leave only an opening sufficiently large to be covered by the egg.

The egg is held between fingers and thumb at the lower end in front of the light; in a new-laid egg the yolk is scarcely visible, the white preventing more than its shadow from being seen. If the egg is turned quickly from side to side the yolk can be detected, and if the egg is stale it will appear much darker as the egg is turned. The air space will also have increased in size and be shown by a distinct rim. Blood spots can be seen when candling, and bad eggs are easily detected by the density or irregular shape of the yolk.



CANDLING LAMP



1 FERTILE
2. ,, (DUCKS)
3. UNFERTILE
4. ADDLED

EGGS AS TESTED ON THE 7TH DAY OF INCUBATION

TESTING EGGS. When eggs have been incubated for six days testing is easy. An up-ended boot box, containing a small lamp, with one end removed and a hole the size of an egg cut exactly opposite the lamp flame makes a good testing apparatus.

Clear or infertile eggs will differ but little from a fresh egg, the shape of the yolk being clearly seen. These eggs are quite suitable for cooking purposes, and make valuable food for chick feeding.

The addled egg is one in which the embryo has ceased to develop; in some the yolk has broken and floats in a cloudy mass, while in others the blood vessels join together in a distinct semicircular line on one side of the egg. Infertile and addled eggs should be removed.

The fertile egg contains a live embryo, which can be seen in the centre of the yolk sac with blood vessels running from its sides, while the yolk appears as an oval shadow across one side of the egg. If the egg is held in front of the light with the side that was uppermost when taken from the nest furthest from the light, the embryo will at once be seen and testing more speedily accomplished.

Testing is simple and an economy always to be recommended, even when only one or two hens are set.

MARKETING EGGS. Thousands of poultry-keepers produce eggs chiefly for their own consumption, and retail the surplus to neighbours, or in seasons of plenty preserve them for future use. The bulk of the English eggs reaching wholesale markets are produced upon the general farms and small holdings, and marketing is most conveniently done through local dealers, unless co-operative methods are adopted.

The present system of wholesale marketing fails to encourage the producer to improve his methods, since the dealer takes all eggs at a price that will secure him for loss on inferior samples, the detection of which is not always possible at the time of purchase. The standard of quality demanded by the consumer is on the up-grade, and unless both producers and middlemen improve their methods foreign competition will in future seriously affect their returns.

Although upon the face of it the producer can see no direct benefit to himself by marketing his eggs in a better condition than his neighbour, who will probably receive the same price for his less carefully marketed eggs, there will eventually be a gain to the individual as well as to the community.

Production is growing in America and the Colonies and will speedily revive throughout Europe, and since the quality of the eggs exported can be controlled, and this country offers such excellent facilities for the marketing of surplus products, home producers must expect to meet even stronger competition from abroad than in the past.

Eggs should at least leave the hands of the producer in the best possible condition, as in passing through the hands of one or more middlemen it is some days before the egg reaches the consumer.

The poultry-keeper's aim should be to market his eggs at least twice weekly, and as a guarantee of their new-laid condition no egg will then be over four days old when sent out.

Grading to size should be studied as far as possible, and eggs weighing under two ounces should not be considered of the standard necessary to maintain a reputation for the best quality produce. Small eggs may be marketed separately or put by for home consumption.

Attractive appearance is an important factor: mis-shapen, stained, and dirty eggs detract from this. Stains and dirt may be removed with a damp cloth and some Monkey Brand soap, but washing is to be avoided owing to the extra labour and for the reason that much of the natural bloom is removed.

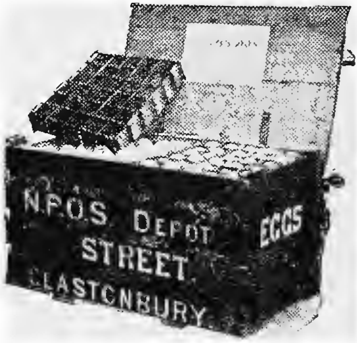
Sectional Boxes are most suitable for eggs sent by rail, and there are many good types from which to choose. Light, strong boxes with cardboard divisions that can be easily renewed are recommended, and wood-wool as a packing has been found the most suitable material to use. Whatever may be used for packing must be perfectly dry and clean. Returnable cases should have the name and address of the owner clearly stencilled on the lid. Some of the most practical and most effective cases are those made by the Street Egg Depot, Ltd., Somerset.

PRESERVING EGGS. In spite of the increase in winter production, the demand for preserved eggs during autumn and winter increases. The producer is placed in the most favourable position for preserving the eggs in good condition. Preserving can be done cheaply and effectively and there is generally a considerable profit attached. It is unnecessary to consider any other means of preserving than the use of *water glass*; the instructions are generally given upon the tin, but a repetition of the important particulars to follow is not out of place.

The solution is made with boiling water to the strength recommended, although a weaker solution has often been found equally effective and leaves less sediment. The water must be first thoroughly boiled and the solution allowed to become quite cold before use.

A glazed earthenware vessel or an iron bin with a covering is suitable; new dustbins formerly costing six shillings and capable of holding a thousand eggs have proved most satisfactory; the bin should be kept in a cool place.

It is better if the solution is placed in another receptacle and added to cover each batch of eggs as they are put into the preserving bin. The eggs should be allowed to get cold after laying, and then immediately preserved. Dirty, cracked, or thin-shelled eggs must be left out. Eggs purchased for preserving should be carefully looked over for cracks in the shell, and it is well to advise the vendor, when ordering, of the purpose for which these are required.



TWENTY DOZEN EGG CASE

If the eggs in the bottom layer are carefully placed in an upright position, small end downwards, it will be comparatively easy to lodge the remainder in a similar position; the object of this arrangement is to keep the yolk in a better position in the egg, an advantage if the latter is required for boiling. The eggs should be rinsed with clean water when taken out of the water glass for use or sale.

The practice of mixing preserved with the new-laid eggs for sale in the dearer season as "new-laid" is most reprehensible. This can be detected, but dealers cannot be put to the trouble at the time of buying, and the result is the spoiling of the market for all and to create a general distrust of English eggs.

CHAPTER VIII

NATURAL AND ARTIFICIAL METHODS OF HATCHING

LARGE numbers of artificially incubated eggs are wasted annually owing to the embryo dying in the shell during the later stages of development, and the hen still retains her position as the surest means of hatching an egg. The strongest advocate of artificial methods will often place sittings of special value under a hen. It is, however, plainly quite impracticable to carry on some of the most satisfactory systems of poultry-keeping without artificial means of hatching, and for securing methodical management upon any large scale the use of incubators is in the long run more economical.

The keeping of more prolific laying hens and of breeds with less tendency to broodiness make it increasingly difficult to secure hens for sitting in the early part of the season, and artificial methods will become still more essential as the industry develops.

For the small poultry-keeper who desires to hatch his own birds—even though he has to wait later in the season than he may wish—the hen is undoubtedly the best means both for hatching and rearing, but he has the alternative of purchasing day-old chicks.

NATURAL HATCHING. *Broodiness.* The instinctive desire in a hen to hatch the eggs she lays is upset by the daily removal of her eggs from the nest. The hen will go broody much more rapidly if eggs are left in the nest to accumulate gradually. The removal of the eggs, the supplying of food tending to increase laying, and the use of breeds and individuals for breeding with the sitting instinct less strongly developed results in a reduction of broodiness in our flocks. It is, nevertheless, the easiest character to revive in a strain.

The heavy breeds provide our best sitters, breeds of the lighter type sit less steadily and are more timid. The Orpington is probably the best sitting breed of any : they are gentle, docile birds, covering the eggs well, very manageable and splendid mothers. The Sussex and the Wyandotte can also be classed amongst the best.

Broodiness is quickly recognized, the peculiar noise made by the hen, the ruffling of her feathers when anybody approaches the nest, and her fussiness about the yard attract the attention.

The temperature of the bird rises when she becomes broody, and frequently some of the breast feathers are shed.

Curing a Broody Hen. If not required for sitting the hen should be taken from her nest upon the first sign of broodiness, and placed where there is no opportunity for her to nurse the inclination. An ordinary hen-coop with open barred floor raised from the ground to allow the air to circulate beneath the bird, provides the best accommodation, giving sufficient protection without comfort. The coop should be placed in the open in full view of the other birds, and the hen receive an ample supply of the ordinary food, with fresh water. Under this treatment she can generally be returned to her pen in three to five days, and expected to lay within a fortnight. Apart from cruelty, the old practice of dipping the bird into a bucket of cold water is no cure for broodiness.

Sitting a Hen. If the bird is required for sitting she should always be allowed to remain a few days on the nest to which she is accustomed, in order to become properly broody before removal to the specially prepared nest. This is most important earlier in the season when birds moved too soon may refuse to sit altogether.

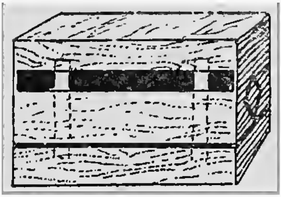
The best nest is a shallow hollow, shaped like a large saucer made in the ground ; while not essential, the nest is best formed upon soil. The hollow should be sufficiently large to take the requisite number of eggs and not so sloping that these are packed together. A light covering of short straw, hay, or wood-wool should be placed on the earth, and a few dummy eggs will complete the preparation.

The bird should be thoroughly dusted with flowers of sulphur upon removal to the nest ; this is best done after dusk. When allowed off the nest the following morning to feed it will soon be seen whether she is sufficiently settled to receive the sitting of eggs intended for her. It is better to replace the dummy eggs with a proper sitting at night time. A hen of average size will cover twelve to fifteen eggs ; the smaller number is advised during the early part of the season.

Sitting Boxes. A nest-box with a front shutter is recommended, which upon removal permits the hen to step off her nest to feed, and to see and to return quietly to her eggs without the necessity of handling by the attendant.

For a single nesting box an inverted cube sugar box without a lid and with one side made into a shutter forms a simple and spacious sitting box. Enough room must be allowed for the hen to change her position in comfort and boxes require to be fifteen inches square. Good ventilation is also necessary. If made weather-proof the box may be placed in the open in a quiet, sheltered spot: this is advocated except in very cold weather.

Treatment while Sitting. Food is only required once daily, and either barley or wheat is preferred. Fresh water and green food should also be supplied. Food is best given first thing in the day; the hen will then sit more quietly during the hours of daylight. A dust bath must be placed close by, for use by the bird when off to feed.



A CHEAP SITTING BOX MADE FROM A SUGAR CASE

Gentle and quiet treatment is necessary, for both hen and attendant will easily become distracted by impatient management, when broken eggs are likely to result.

Should the bird not leave her nest to feed on the first occasion she can be left alone; after this it is well to remove her daily if she fails to come off voluntarily. On the nineteenth day of sitting the hen can be left undisturbed, but the front of the box should be opened for a short time.

Judgment must be used as to the length of time the hen may remain off her nest. In mild weather, after the eggs have been incubated a fortnight, she will sometimes stay away from the nest for an hour without any harm being done, but ten to fifteen minutes is generally sufficient in cold weather, and during the early stages of incubation.

Where there are a large number of sitting hens it is preferable to pen these off in small batches, liberating each batch to feed together. Another good plan is to tether them by the leg to a stump in front of the nest-box, with food and water at hand. They will soon become accustomed to tethering.

Many of the sitting boxes which are designed with a small run attached for each hen separately are most inconvenient for attention, and the space is too cramped for the hen. Egg testing is only required once during the period; this is best done on the sixth day. If the nest is soiled or an egg broken this should be cleaned up and soiled eggs washed if necessary with warm water. Disturbance of the hen at hatching time will often cause her to trample on and kill her chicks. The hen and chicks are better left on the nest for twenty-four hours after hatching, provided this is comfortable and clean.

ARTIFICIAL INCUBATION. *Dead in Shell.* Many theories are held as to the reason for " dead in shell " in an incubator, but never under the sitting hen except from some very palpable cause such as desertion of the nest. Hundred per cent. hatches are common with the hen, but rare with the incubator.

There are several directions in which artificial methods fail to imitate nature. It is quite possible there is some merit in the contact of the egg with the body of a hen apart from the heat so obtained. The frequent turning of the eggs and changing of their positions by the hen lead to constant variation in the temperature of different positions of the egg. No effective methods have yet been devised for imitating this; the egg in an incubator generally remains in the same position and at an even temperature for twelve hours at a stretch.

The moisture variations when hatching by hen seem to rule out the claim that the regulation of this in an incubator is a factor of any great importance. The circulation of air below and through the egg is unnatural. This point, and the temperature and turning, appear to need closer investigation.

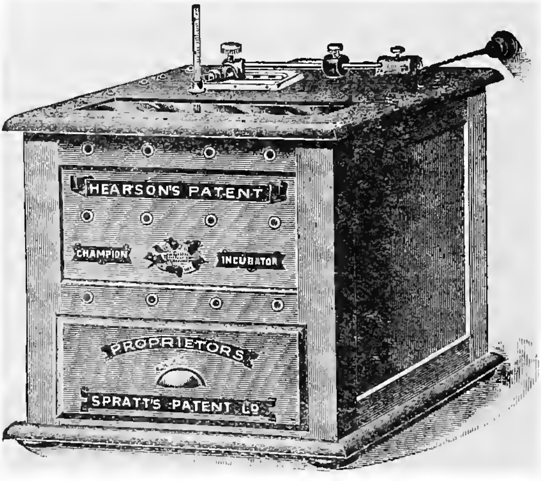
Much careful research is needed in various directions, and were it possible to give figures to show the extent of the waste in eggs under the present conditions of artificial incubation it would speedily be realized that money spent in this direction could be saved in a few months if the problem of dead in shell were solved.

Incubators. There are two types of incubators—hot water and hot air. With standard makes of both types equally good results are secured, but the hot water machines are only made to hold a limited number of eggs, and for hatching in large quantities the hot air machine of greater capacity is more economical in labour and fuel for heating.

Except in the most expensive machines a

difference in the hatching capacity of individual incubators of similar pattern has been frequently noticed; this can only be attributed to superiority of material and workmanship.

Owing to the number of good machines on the market it is quite impossible to recommend any particular make or to describe in detail the small points in which they differ. Working directions are supplied with a new machine; these should be carefully read or a copy secured if the machine is purchased second-hand. A few hints on management dealing with the main principles, and to supplement the maker's directions, here follow:



HEARSON INCUBATOR (ELECTRICALLY HEATED)
Capacity for 50 eggs

Starting the Incubator. A position should be chosen for the incubator free from draughts, and where the surrounding temperature is subject to small variation. A fairly high temperature in the room is preferred if this is well ventilated.

Experience indicates that the dangers from vibration are frequently exaggerated, but a sudden jar to the machine or drawer is bad and a solid floor will obviate risk from vibrations caused by heavy traffic or slamming doors.

The incubator should be carefully regulated and the temperature remain steady for several hours before the eggs are placed in the drawer.

Freshness of the egg is important. An egg over seven days old is not generally considered suitable for hatching artificially. A gradual heating-up of the eggs in the incubator is desirable, and the lamp should be lowered when first these are placed in the drawer without any alteration being made in the regulator. Another plan is to place the eggs in a drying-box for several hours beforehand.

Temperature. The temperature at the top of the egg in an incubator should be maintained as nearly as possible at 103° F., since it is the temperature of the actual egg that counts. Too much reliance must not be placed upon a thermometer suspended above this. In some incubators a difference in temperature of as much as 2° has been found between a suspended thermometer and another placed on the top of a fertile egg owing to the former being nearer the source of heat. As a result of this it will be readily seen that if the suspended thermometer had been depended upon and kept at 103° the eggs would be incubated at too low a temperature, and an indifferent and overdue hatch obtained.

The reading of the thermometer ordinarily used above the eggs should be checked against that of a clinical thermometer placed on top of an egg after this has been incubated for forty-eight hours, or at a later period, provided the thermometer rests upon an egg which is known to be fertile.

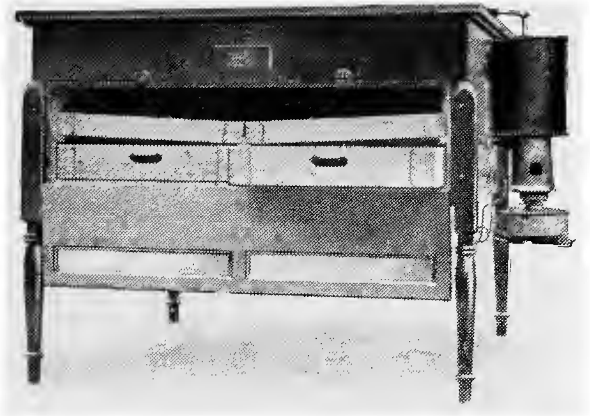
An even temperature in all parts of the drawer is a desirable condition, as the egg remains in the same position in the drawer for twelve hours at a stretch. If it is variable, this may to some extent be overcome by changing the position of the eggs when they are being cooled.

Ordinary thermometers are liable to considerable error, and it is always advisable to check them by one which is known to be accurate.

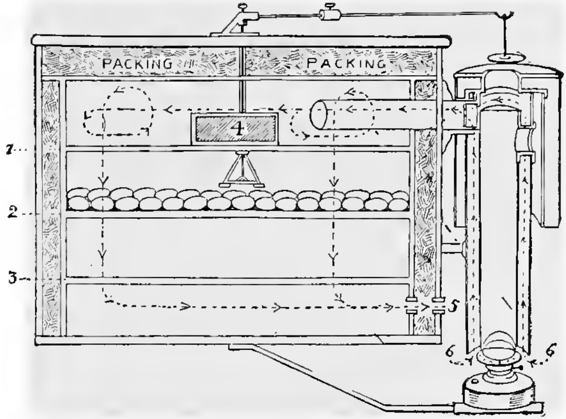
As incubation progresses the natural heat of the egg will be greater, and less artificial heat will need to be supplied. This alteration will be done entirely by the adjustment of the heat regulator; only slight alterations should be necessary, and with care and good judgment the operator can keep an even temperature throughout the period in a well-made machine.

When an irregularity in the temperature is discovered during incubation an effort should be made to detect the cause before removal of the drawer or any hasty measures are taken to correct this.

Cooling. Cooling of the eggs once daily is advised. Definite recommendations as to the length of time the eggs should be allowed to cool are unsatisfactory. This will vary with the temperature of the room in which they are cooled, and the stage of incubation reached by the eggs. For the first three or four days the drawer need only be out sufficiently long to allow the eggs to be turned; from five to thirty minutes may then be allowed, but the aim should



EXTERIOR



INTERIOR

1. Upper Diaphragm
2. Egg Tray
3. Lower Diaphragm
4. Position of Water Tray
5. ,, Adjustable Ventilator
6. Current of Fresh Air

HOT AIR INCUBATOR

CAPACITY FOR 350 EGGS (MADE BY ROBERT MILLER)

be to cool the eggs to about 98° F., as judged by feeling the eggs.

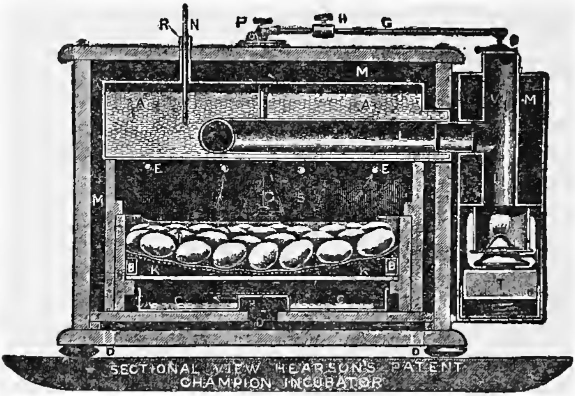
In an incubator the eggs will not be as rapidly heated through in the egg chamber upon returning the drawer as by contact with the body of the hen upon her return to the nest. The cooling period allowed in the case of an incubator is therefore less than with a hen.

Turning. Observations have proved that the sitting hen constantly alters the position of the eggs in the nest, thus turning these a number of times daily, and this is therefore considered advantageous. Patent devices in large incubators make more frequent turning possible, but when this is done by hand the drawer has to be removed for the purpose and turning can only be carried out twice daily or the eggs will be cooled too much. Unless the egg is turned the embryo is liable to adhere to the membrane surrounding the white, and die.

The novice is recommended to place a distinctive mark on either side of the egg to insure that none of these are left unturned. The egg is then turned half over on each occasion to bring the under mark uppermost. With the eggs placed uniformly in rows, the easiest plan is to turn two eggs at a time reverse ways, i.e., towards each other, using the finger and thumb, which should be moistened to secure a grip on the shell. In this way the work is done speedily and without jerkiness.

Turning should be done at regular intervals, commencing after the eggs have been thirty-six hours in the incubator. Some experts prefer two or three days to elapse before commencing to turn, but there is no direct evidence that this is any advantage. After the eighteenth day turning should be discontinued and the eggs left undisturbed.

Testing should be carried out on the sixth and fourteenth days of incubation ; it is most important to test and remove the unfertile and addled eggs. If one or two hens have been "set" on the same date as the incubator, their eggs may be transferred to fill up the gaps caused by removal of eggs tested out.



HEARSON INCUBATOR (OIL HEATED)
Showing the principle for supply of heat, ventilation, and moisture

It is worth mention here that much better average hatching has been secured when the eggs have been first placed under hens for from seven to ten days and removed to the incubator to complete the hatching period. This has been done to a considerable extent at the season when broody hens are plentiful and eggs at their lowest price; the period of rest good for the hens is thus usefully employed.

Hatching Time. When the eggs are very fresh they may be expected to chip on the nineteenth day, and with a good hatch the majority of the chicks will be out on the twenty-first day. The incubator should not be opened after the final turning until a number of chicks are hatched, and it is seldom necessary to open this more than twice a day to remove the empty shells and transfer chicks to the drying-box, should this be on top of the machine. It is most important that the hatching chick should not be exposed to cold. Those already out of the shell will take less harm in the drawer for several hours than others struggling to get free, which would be retarded and weakened in their efforts by disturbance and removal from the heat. The chickens are not ready to go into the drying-box until the fluff is dry and their legs strong enough to support them.

If the hatch is a good one the empty shell should be quite dry, the blood-vessels shrivelled up, and the chicks fluffy and clean. Help in releasing the chick is bad in principle; some live, but the majority are weakly or cripples.

The hen will hatch on an average ninety per cent. of the fertile eggs, while it is considered good if an average of seventy-five per cent of these hatch in incubators. No doubt some of the bad hatching can be attributed to the inferior quality of the eggs used in artificial incubation, and hatches only averaging sixty per cent of the fertile eggs are frequently due to the poor condition of the breeding stock, but there is reason also to believe that with hatching operations on a large scale bad results are frequently due to inattention to detail in management.

CHAPTER IX

CHICKEN-REARING

IT is an important fact that the future laying of a pullet is largely influenced by the way it has been reared. Novices are very apt to go astray by attempting to rear in quantity instead of paying the necessary attention to quality. Overcrowding is the greatest evil in chicken-rearing. There is very little doubt that the progeny of highly fecund strains require more careful rearing than did their less prolific ancestors, and that greater attention should be given to vigour in the breeding stock when rearing birds intended for this purpose. Avoidance of artificial methods and conditions in rearing birds intended for breeding is commendable, although upon a large scale this becomes less easy of accomplishment.

It must be admitted that artificial rearing and more intensive methods of management have led to far greater numbers of chickens being raised, but the principle of adopting natural methods should still be followed where possible in the rearing of future breeding stock. It is extremely doubtful if the raising of chickens purely for table purposes upon a large scale is either economical or sufficiently profitable to be worthy of attention. While upon a farm, with its attendant facilities for profitable production, several hundreds of birds may be raised, yet when the numbers run into thousands a much greater measure of control over the birds is needed. This involves heavy charges both for equipment and labour without those compensating benefits possible with the smaller numbers on a wider range.

The value of the pullet is greater for laying than for table purposes, although she does not come into profit until six or ten weeks later. This is now generally realized, and attention is concentrated upon rearing pullets for the purposes of egg production, while there is a profitable outlet for surplus cockerels for table use.

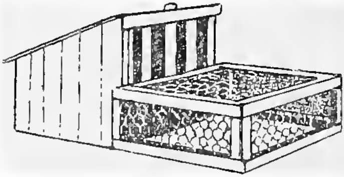
Rapidly reared birds are far more profitable, and the differences in results under varied management are very striking. Cockerels of the heavier breeds and of the same strain, weighing on the average three pounds at twelve weeks old, are found in one yard, while in another they will be only two pounds in weight. The explanation is not necessarily in the quantity or even quality of food given so much as the method of giving it and in general attention to cleanliness.

The cost of rearing on free range is less than upon the semi-intensive system, provided sufficient attention is given in both cases, and the free range birds will be more vigorous and valuable as layers as well as for breeding purposes. Whichever system is adopted the great advantage to the chickens of fresh ground, and abundance of their natural diet in the shape of insects and fresh green food, should not be forgotten.

The respective claims of grass or cultivated land for rearing upon are about equal, though where space is limited and the same site used year after year, ground which is cultivated is much to be preferred. Chickens up to six weeks old will do little or no damage in a vegetable garden, in which they will thrive well.

Rearing by Hens. The mother hen while brooding her chicks should receive as much attention as the laying birds; if she is neglected her brood will suffer, while extra care will bring her back into laying condition before she has ceased to nestle the chicks.

Ten or twelve chicks are the maximum number which should be given a hen of average size, and although late in the season the numbers may be increased, she had better receive too few than more than she can comfortably nestle.



CHICKEN COOP WITH FOLDING RUN

During bad weather, and until the chicks are a week or ten days old, the hen is best kept cooped. After this age the brood will do better with the hen at liberty; she will afford them some protection against their enemies and lead them about the hedgerows and meadows where they will require less feeding and attention.

With only a small area of ground and several broods it is wiser to keep the hens in their coops. The provision of a small run attached to the coop is to be recommended while the chicks are small, and in some instances for their protection from birds of prey. If a run is used, this and the coop should be moved daily on to a fresh patch of ground.

An alternative plan is to erect small fixed pens several yards square with two feet netting, one coop being placed in each pen. Gates are unnecessary with the low netting, which can be taken up easily, stored, and re-erected in a fresh spot each season. This is the plan adopted by Mr. T. W. Toovey, on his poultry farm at King's Langley, and is an exceedingly good one if a large number of broods are to be raised.

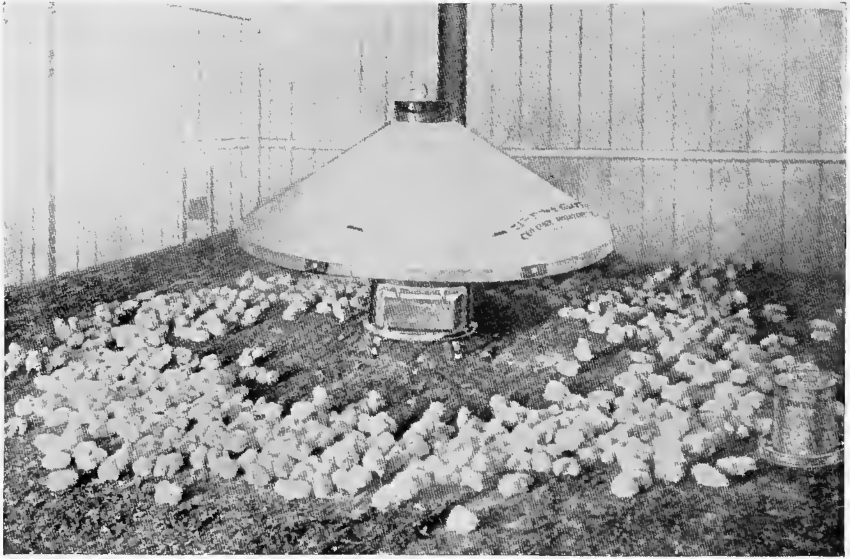
Except when the coops are placed well apart in the meadows and moved daily a floor should be fitted for the better preservation of the ground. In the early part of the season when wet weather prevents the constant removal of the coop on to a clean spot the floor becomes a necessity.

The greater success of foster-mothers for rearing chicks early in the season is largely due to the provision of additional shelter, under which they can feed and exercise in bad weather. For this reason we believe the coop with two compartments (to the second of which only the chicks have access) is an economy. This is not only useful in bad weather, but in the spring and early summer—when the grass is long and wet—the chickens need not be liberated the first thing in the morning, whilst with a single coop they would be too closely confined and become overheated if kept in after the sun has risen. Dry mash feeding is also more convenient if a double coop is used.

When hen-reared, the chicks are liable to attacks from insect pests if the hen is not kept clean; ticks, almost unknown in artificial rearing will do much damage amongst them if not detected and eradicated.

ARTIFICIAL REARING. Greater skill is necessarily required if artificial means of brooding are employed, but common sense is the chief asset to success. Overheating the foster-mother, and keeping the chickens fastened in when they should be running in the open, are very common faults. Although for a time the chicks appear to do well and to make rapid growth, such coddling often brings disastrous results at later stages. The aim should be to harden the chicks off, following nature's method by getting them out in the open at two or three days old. A little patience and attention are required to accustom them to return to the brooder for warmth, but they will quickly learn, and the trouble taken in the first few days will be amply rewarded later.

Observation will teach the attendant the best temperature at which to keep the foster-mother: the weather and the chicks themselves will be his best guide. The temperature of 85° F. is sufficient when the chicks are first placed in the brooder; their body heat will probably raise this to 90° F., above which it should not be allowed to rise. Excessive heat will render the chicks very susceptible to chills. For guidance it may be stated that the temperature is gradually lowered 5° each week, but after the first day, when the chickens can be safely left with the trap open into the second compartment, the need for using a thermometer becomes less during the daytime. There is generally less danger of overheating than underheating with the chicks constantly in and out, and it is a bad sign to find them huddled up for any long period in the heated compartment; they return to this from outside in order to get rapidly warmed when, if the compartment is warm enough, they are quickly out again.



ANTHRACITE STOVE

FOR CHICKEN REARING IN LARGE NUMBERS (DESIGNED BY E. H. SOOLE, HERMITAGE, BERKS.)

The risk of overheating at night is greater: it must be remembered that the entire batch of chickens in the brooder together generate considerable heat themselves, and this even on cold nights can be allowed for as a set-off against the lower temperature outside. In the early stages it is seldom necessary to raise the lamp at night, and when the chicks are bigger artificial heat can often be dispensed with altogether at night before it can during the daytime, especially in bad weather when the extra heat is required to dry the feathers of the chicks and revive them after exposure. A window through which the chickens can be seen at night without disturbance will guide the attendant better than opening the brooder to read a thermometer·

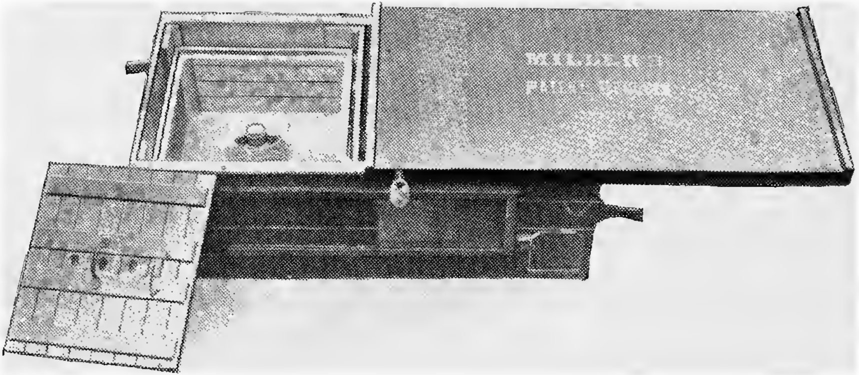
Brooder Houses and Stove-heaters. These are only practicable when dealing with large numbers; attention to the chicks is greatly facilitated in large houses in which the attendant is under cover. With a large brooder house, which is either fitted with hot-water pipes or with individual indoor brooders for the chicks, the difficulty is the provision of sufficient outside run. With fixed houses such as these the surrounding ground becomes speedily used up when occupied by chickens year after year. This may be overcome to some extent by careful attention to cleansing the land.

The introduction of stove-heaters capable of accommodating three hundred to five hundred chickens is an advance on hot-water pipes, but the smaller house which can be used for this should be made for easy removal to fresh ground. The cleanliness and disinfection of these houses must be carefully looked after, and even then mortality among such large flocks of chickens kept together must be expected to be heavier.

Foster-mothers. The foster-mother holding from fifty to seventy chicks is a necessary adjunct to an incubator. Presumably to coincide with the capacity of the incubators, foster-mothers are advertised to hold a similar number of chickens; but, actually, we have never seen a hundred-chick foster-mother, sold as such, which should be used for more than seventy chicks, and even then the number needs reduction at three weeks old. The poultry-keeper is fairly safe in reckoning that the hundred-chick size will suit a hundred-egg incubator from which he can only reckon upon hatching eighty chickens, but it would be much better if the majority of the foster-mothers offered were larger in size.

With a number of satisfactory foster-mothers on the market of varying design only a general description is needed, and a warning is given against certain defects in carrying out important principles. The heat given should descend upon the backs of the chickens. Bottom heat, or arrangements of this which lead to the overheating of the floors, is a very bad fault resulting in leg weakness and internal disorders. With the object of permitting plenty of fresh air, the heated chamber of a brooder requires to be spacious. Ventilation is somewhat difficult without loss of heat, but it is important that fresh air should gain entry during the night when the foster-mother is closed for many hours.

The foster-mother usually consists of two and sometimes three compartments, the second of which must be floored as a protection against rats, also for the purpose of containing dry scratching litter for the chicks. The door between these compart-



A SIMPLE AND PRACTICAL CHICKEN BROODER

ments should remain open and be so placed that the chickens will easily find their way to and fro.

For the reason that the foster-mother ought to be frequently moved on to fresh ground, it must be moderately light in weight, not too broad for the reach, and with handles placed conveniently for lifting, details which appear to be overlooked by some makers.

Another oversight is lack of convenience in cleaning; the thorough cleaning and airing advocated is well-nigh impossible of accomplishment in some designs of foster-mother. One of the simplest is that made by Mr. Robert Miller; in this the heated chamber is a separate box which can be lifted right out and cleaning be rapidly and effectively done. The lamps, with chimneys and flues which become choked, are a frequent source of trouble. There is danger of firing, and an endless waste of time and matches when lighting them in the open. The hurricane lamp is the most practical solution of these difficulties.

Although averse to making any special note of a particular appliance and quite able to find some faults in Mr. Miller's design, we are obliged to say, for the sake of amateurs, that his is the best attempt to carry out general principles that we have used in the course of a wide experience.

Hovers. Hovers of the type illustrated are taking the place of foster-mothers to a considerable extent. These are used either in a small chicken-house or are suitable as indoor brooders in a house of larger type. The cost of these is small in comparison to the outdoor foster-mother, and the chicken-house is a necessary adjunct in either case for the young birds at a later stage. The hover has the additional advantage of requiring less storage space when not in use.

Another very practical, simple, and economical appliance upon a similar principle has been used most successfully during the last few years. This consists of a hurricane lantern with a broad deflector to throw down the heat resting upon it, and can be suspended from the roof of the chicken-house at any height required to maintain the heat necessary for the chicks resting on the floor—in accordance with their age. This appliance was made by Mr. T. H. Burgess of Exeter for his own use, and is of particular value in the early season for providing some warmth to the larger chickens during severe weather after removal from the foster-mother to chicken-houses.

Fireless Brooders. The fireless brooder consists of a box eighteen inches square and ten inches deep with a lid at the top. At a height of six inches from the floor a light wood frame rests upon corner supports; across this muslin is stretched, upon which a small wool or feather cushion is placed to rest upon the backs of the chickens when standing.

The cushion conserves and adds to the heat generated from the bodies of the chicks, and with a nest of hay of suitable size to allow them sufficient room to move about no artificial heat is necessary.

Ventilation holes at the top and lower sides of the box in addition to an entry hole for the chicks are most necessary, and care must be taken to supply a sufficiency of fresh air.

In the writer's experience upon a limited scale this method has been a great success, and is a most satisfactory solution of rearing a small number of chickens—from twelve to twenty in a batch—when broody hens are not available.

The necessity for good ventilation to prevent overheating and prevention of the hay or cushion from becoming damp is of greatest importance. It is necessary to keep the chicks in together for the first few days after hatching, only allowing them out for short periods to feed and exercise. Nothing more than common sense is required for successful management.

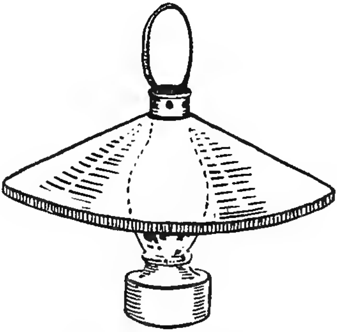
Upon at least one farm in this country thousands of chickens are successfully reared on this system, although it is condemned by others who have failed, probably due to too strictly copying the methods followed in America whence the principle originated.

A few chickens can also be raised with little trouble in a sugar box with a hot-water bottle wrapped in flannel, and placed on a frame a few inches above the floor.

Feeding Chickens. Apart from hereditary weaknesses, the chief causes of the mortality amongst young chickens are chills and digestive troubles. We are quite sure that the little chicks suffer largely from lack of sufficient green food, and also that the first foods given are frequently most unsuitable for their delicate digestive organs.

While the methods of feeding advocated here are mainly intended for the poultry-keeper rearing smaller quantities of chickens, and we fully realize the difficulties which attend the rearing of larger numbers with the problem of finding experienced and trustworthy labour to carry out this work, we feel very strongly that some of the labour-saving methods practised in raising large quantities are often far from economical.

The use of egg and of new milk as a first food will appear to many very antiquated and by some be condemned. This food is, however, very valuable if properly used, and the small quantities required amount to very little in cost when only given for the first day or two. The white of the egg if hard boiled is indigestible and the first feeds should be prepared as follows: Infertile or cracked eggs should be scrambled with a little milk; when almost reaching the ordinary consistency of scrambled eggs remove from the stove and stir in fine biscuit meal; add to this finely-chopped young green stuff, such as "goose-grass," clover, dandelion, or lettuce; a small quantity of raw onion is a most valuable addition.



HURRICANE LAMP HEATER

With deflector, for use suspended from the roof in a small chicken-house

Fine middlings, Sussex ground oats, or maize meal may be added to the biscuit meal on the third day and the egg food discontinued, unless infertile eggs are plentiful. Chopped onion and young green stuff should be continued to such extent as facilities afford for securing and chopping this.

The proportion of other meals should be steadily increased as the chickens grow, and they should be used in combination, lessening the biscuit meal.

Rice is greatly valued for chicken feeding if boiled in skim milk, or failing this in the stock from bones. It is important to cook the rice to a proper consistency, and not to get it sticky by bursting the grains. A little oatmeal may be added to the rice with advantage.

Any scraps of cooked meat, pudding, or potato may be given, and after eight weeks old barley meal can be included in the diet. Dry bran of good quality may be given from the commencement; this should be placed in boxes always accessible to the chicks. Cracked wheat and cracked maize, groats, or coarse oatmeal are the best hard food; but dari, canary seed, and small quantities of hemp are valuable for variety.

Feeding should be at regular intervals of two and a half to three hours, the interval being lengthened after a month old, and at twelve weeks reduced to three feeds a day. Soft and hard foods should be given alternately, and in the early stages only small quantities at a time. At twelve weeks the young birds may be fed similarly to the adult stock.

The best alternative to this method of feeding, in order to save labour, is the use of dry mash, but even then one or two wet mashes daily are advised. Ground oats, middlings, and maize meal added to the bran form a suitable dry mash.

For the sake of keeping the chicks busily engaged a little cracked grain should be kept among litter to encourage them to scratch. Charcoal sprinkled in both wet and dry mashes is beneficial.

Care and attention in the early days of the chicken's existence are of great importance. They should make steady growth without that check which is likely to occur at certain stages if unduly forced or neglected. While feathering, from ten days to eight weeks of age, these checks will be likely to occur from overcrowding in foster-mothers and unsuitable feeding. Linseed in small quantity, preferably cooked and thoroughly mixed in with the other meals, is an aid to growing the feathers.

A further check frequently occurs at fourteen to eighteen weeks of age, when the appetite of the young bird is large. Young cockerels will consume half as much again as the adult fowl at this stage, and it is false economy to keep them short of food.

Housing Accommodation. The ideal size of flocks artificially reared is fifty chicks up to six weeks of age, and twenty-five after this age. Extra equipment for the avoidance of overcrowding is a sound investment.

At six to eight weeks of age chicks can generally be drafted into small houses, and when this is done the pullets and cockerels should be placed in separate flocks as both will then develop better.

Much must be necessarily left unsaid in dealing with the subject of chicken-rearing ; it is a mass of detail and cannot be successfully accomplished by rule-of-thumb methods. There are comparatively few good chicken-rearers ; the patience, observation, and natural gifts of the individual are everything, and the work is very trying and incessant even when there is much interest taken. For these reasons women are generally far better adapted to the work and are cleaner and more thorough in their methods.

CHAPTER X

TABLE POULTRY

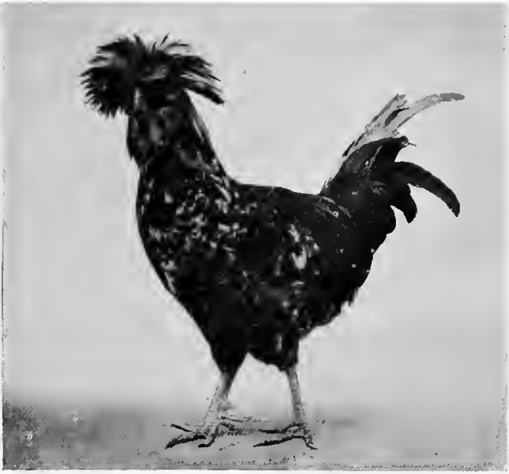
IT is very questionable whether the raising of table poultry on a large scale is a profitable branch of specialist poultry-farming; but for the farmer and smallholder table poultry are a paying side-line, and all poultry-keepers should be able to make a profit off their surplus stock in this way. Birds marketed between September and March leave a narrower margin of profit than during the other months. Fowls are plentiful in the autumn, and the game season interferes further with the demand for these. Except on the farm, late chickens ready about New Year are costly to produce; the expense of feeding birds through the winter is heavy, and efforts to meet the demand for young birds in these months cannot be recommended.

Small, irregular consignments of poultry do not receive very favourable treatment in the large wholesale markets, and the small poultry-keeper is frequently better served by the local dealers. Generally speaking, only when there is a glut of poultry on the market will he do better by supplying direct to the consumer through post or rail. Standing orders for a regular supply are usually difficult to meet. These, at times, involve much trouble in keeping up the supply, and a loss is sustained when birds which are fit for killing have to be held back to meet orders. The producer of table birds in large numbers is generally better advised to place them on the market in batches as soon as they are ready. If held back the birds lose in condition, and additional expense in food and attention is incurred.

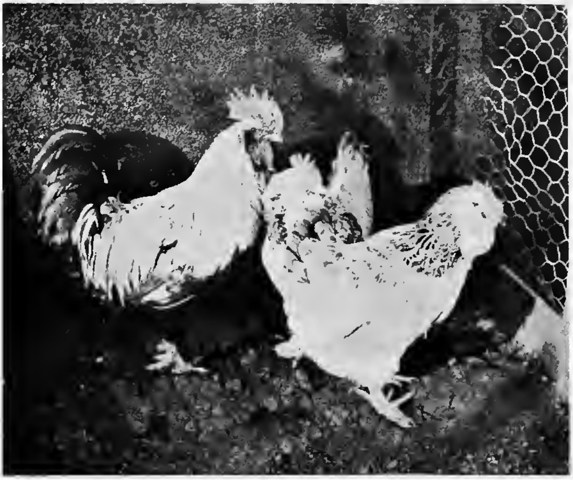
"PETITES POISSONS." The demand for little chickens of eight to ten ounces in weight is erratic but generally profitable, and the producer of any large number of chickens, raised mainly for the purpose of securing pullets, will find it far more profitable to market the young cockerels of such breeds as the Leghorn at this early age than to keep them until ten to fourteen weeks old. It is advisable to arrange beforehand with a salesman, indicating the date when the chickens will be ready, and also giving the approximate number; and to send the birds alive.

SPRING CHICKENS. Young birds weighing from two to three pounds are generally very profitable from March to midsummer. These realize better prices in the open market. It is a very common fault to retain the birds too long, as the demand is mainly for birds of this size, and heavier birds often lose the early market and its attendant high prices. Spring chickens should be sent to market clean picked and nicely tied down, but never drawn.

YOUNG FOWLS. The demand for young fowls of three and a half to four pounds in weight sets in about June and continues until late autumn. Larger birds are preferred for the Christmas market, and it will pay the producer better to hold his birds over to meet this demand for fowls weighing five to seven pounds if he is in possession of the necessary accommodation.



HOUDAN COCKEREL



SALMON FAVORELLES

Sufficiently improved prices are generally secured for dead birds clean picked and nicely prepared to compensate for the trouble of this. But if the number is very limited, and the market not easily accessible, a local dealer taking them alive may prove more convenient.

OLD HENS. These mostly meet a readier demand alive rather than dead. The market is keenest at the times of the Jewish festivals, but there is a fairly constant demand for old hens for boiling, and by potted meat manufacturers.

PREPARATION FOR MARKET. "Petites Poissons" and spring chickens are presumably in well-fed condition, and need only be fasted for twenty-four hours before killing. It is an advantage to give extra good food for a few days before the birds are killed, but they should not be shut up with the object of fattening. Young fowls and old hens will be greatly improved in quality by penning up for a fortnight before being killed. A properly made fattening coop should be used for this purpose; these are cheap and more convenient than any other means of penning birds for fattening.

FATTENING. The cage is raised about three feet from the ground; this height is convenient for attending to the birds. A cage about seven feet in length with three compartments will hold twelve or fifteen birds in comfort. Birds placed singly do not do so well owing to the lack of competition for the food. Before being placed in the cage the birds should be freely dusted with sulphur. A preliminary twelve hours' fast is advised to induce eagerness for the food, after which the birds should be fed twice daily. No water should be given them to drink.

The food should consist of middlings and ground oats, or of middlings, barley, and maize meals in equal proportions; this should be mixed several hours beforehand and allowed to stand. Separated milk, preferably sour, or buttermilk, should be used if available; the food should otherwise be mixed with cold water, which in any case is good enough for old hens. It is important to make the food of right consistency to allow the birds sufficient moisture without this being too thin; the consistency of thick porridge is the right thing. In hot weather a sprinkling of flowers of sulphur mixed well into the food can be recommended.

If the birds lose appetite it is well to omit a meal and in its place to fill the trough with clean fresh soil. This will generally restore their appetite. Another good plan is to supply them with dry bran immediately after the evening meal. Grit should also be given. Before the birds are killed it is most necessary to fast them for twenty-four hours; this will greatly improve their appearance and the keeping qualities of their carcase.

This period of final feeding with the birds closely confined makes the flesh of much better quality, and will add on the average one pound in weight in the period—from ten to fourteen days—which is allowed. The term "half fattened" is applied to birds which have undergone this treatment to distinguish them from the fully fattened fowl, which is machine crammed.

Cramming is a special business, and should only be undertaken in special circumstances. The ordinary poultry-keeper has no use for a cramming machine, and the method of fattening described above can be carried out with little extra trouble and expense. This method should be much more generally adopted in order that English produce may outclass that imported from abroad.

To Kill a Fowl. Hold the fowl head downwards in the left hand with the palm over the back of the hocks, at the same time gathering the tail and the end feathers of both wings into the hand. Then take the head between the first and second fingers of the right hand with the back of the skull lying in the hand. Hold the bird in a perpendicular position, with the head bent backwards at right-angles to the neck, when with slight pressure downwards the neck will be dislocated. Death will be instantaneous, and the after-struggles of the bird are only the result of muscular contractions. The break should be made between the skull and atlas, or top-joint, of the neck. Care must be taken to break the neck immediately below the skull ; none of the neck feathers must be held in the two fingers or the skin of the neck may be torn, so causing bleeding and the exposure of an unsightly mass of blood. After death the bird should be held head downwards to allow the blood to drain from the body.

Plucking. Plucking should commence as soon as the bird has been killed. The feathers come out more easily while the body is hot, and at this time there is less risk of ripping the skin than when warm or half cold. Before plucking, the hand should be passed over the feathers pressing them backwards in order to loosen them. The feathers are pulled out with a slight jerk ; plucking should begin at the top of the back and the shoulders, passing on to the breast, neck, and wings. The legs and lower part of the body are done last. The most tender parts are on the breast and behind the shoulders. The birds should be plucked clean with the exception that sufficient of the neck feathers are left to conceal the space in which the blood has collected.

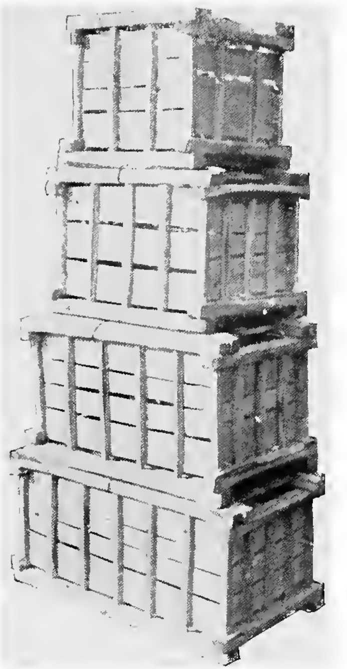
Properly speaking, birds should not be killed when in process of growing new feathers, but this cannot always be avoided. "The stubs" or new feathers are best removed with the aid of a small blunt knife, gripping them between this and the thumb. Stubbing may be done by an unskilled worker without risk of damage.

With a fowl wanted for home use the quickest way is to plunge the body into water at a temperature of 135° F., when the feathers come out very easily; but this is not recommended for birds intended for market.

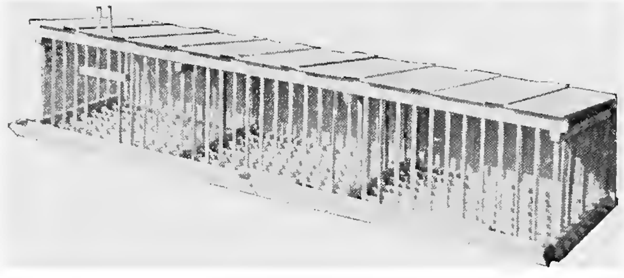
TYING FOR MARKET. Fowls sent to market should be uniform in appearance and shaped to look their best. Fatted fowls are shaped in a press, but other classes of table poultry should be tied down. The toes are pulled down at the top below the wings and tied at the back and the hocks afterwards drawn down and secured at the tail; this process throws up the breast. Methods of tying differ in certain details to suit certain types of fowls, and these can only be learnt by practical demonstration.

DRAWING AND TRUSSING FOR TABLE. Birds should not be trussed until quite cold, and will keep better if left undrawn until required for cooking. Drawing can be done very rapidly, and with care the whole of the internal organs can be removed intact without contaminating the carcase. Trussing can be done with skewers, but a needle and string are better for pulling the bird tightly together, as a result of which it will cook better and the removal of the string before serving is a simple matter.

ROPING. This consists in removing the intestines



PACKING PADS



FATTENING COOP

through the vent, and is necessary in very hot weather, or when the bird is killed without having been properly fasted. Where necessary, roping should be done before birds are sent by rail to prevent the flesh turning green. To learn the best methods of drawing, trussing, and roping demonstrations are necessary.

PACKING. Birds sent direct to the private consumer by post should be drawn and trussed, and can be made into an ordinary parcel; white cardboard boxes or bass baskets make a more attractive package. Birds should never be packed until the flesh is quite cold, and every precaution should be taken to insure their arrival in clean and fresh condition.

Special "peds," used by fatteners, are made of convenient design to hold from one to two dozen birds, but hampers or light wooden cases serve the purpose. The birds should be packed firmly together in rows with the heads to the outside of the crate and below the level of the body; clean straw is placed on the bottom of the box and between the layers of birds, and white paper placed over the breast to preserve a fresh appearance.

CHAPTER XI

TURKEYS, DUCKS, AND GEESE

TURKEYS

WHERE turkeys are kept with other poultry they do less well, and only when there is sufficient space for them to be separated should they be kept on the poultry farm. A " clutch " of turkey eggs hatched and reared by the amateur poultry-keeper on a limited grass run may be worth his while to secure birds for his own table, but the proper place for turkey-rearing is the farm, where wide range can be given and a sufficient number may be reared to warrant special attention.

The care necessary for the successful rearing of the young birds involves close attention, but the larger flock does not increase the time needed proportionately. This justifies the recommendation that turkey-rearing if undertaken on the farm at all should be made a special feature. Providing the conditions are favourable, e.g., a genial, quick-drying soil and natural shelter from high winds and driving rain, turkeys are a most profitable adjunct to the farm.

BREEDS AND BREEDING. The useful varieties are limited to the *American Bronze* and the *White* turkey. The *Black Norfolk* breed is practically extinct, and the *Cambridge Bronze* need not here be distinguished from the American.

The Bronze is a larger and hardier bird than the White, and for this reason more popular, but as a means of introducing fresh blood and vigour into the strain, a cross between the two breeds can be recommended. The number of distinct strains of turkeys is very limited: in-breeding must be avoided, and stag birds from an entirely fresh source introduced in each new mating.

Careful selection should be made of the breeding stock, and only healthy, well-matured birds chosen. Very large turkeys seldom make the best breeders, a young stag weighing twenty to twenty-five pounds and hens fifteen or sixteen pounds will form a good pen of Bronze. The White turkey weighs four or five pounds less. Both sexes, and more particularly the female, are better for breeding in their second season. A stag is usually mated to from eight to twelve hens; undermating may cause rough treatment.

HOUSING. Fresh air is of the greatest importance both for the adult and the young turkey. A large open shed in which the birds can roost high above the ground is best. Shelter from rain and wind is needed in the cold months; during the summer and autumn the only protection necessary for the birds is from living enemies, but for this they could be left to choose their own roost and would be most likely to select the trees or a barn roof.

MANAGEMENT. The breeding stock are better located in a sheltered field near a wood than round the farm-yard, although the stack-yard is a most suitable spot. Mash food is less suitable than hard grains; peas are particularly good when mixed with grain, and will be readily taken when the taste for them has been acquired. Some soft food, mainly middlings with a little maize meal or barley meal and boiled lights or vegetable, should be given in bad weather or to induce laying; also roots at which to pick when facilities for green food are limited.

Eggs can be expected from the young hens in January, and the older hens a month later. Nests should be provided in quiet, concealed spots to facilitate collection of the eggs, but the hen will often travel some distance to find her own spot, and if the nest is not found will go broody too soon. The birds should be watched when liberated in the morning and after feeding, when, if cautiously done, the hen can be tracked to the nest, and by removal of all but a nest-egg a much larger batch will result.

HATCHING. The period of incubation is twenty-eight days. The eggs should be set under an ordinary hen which will cover seven or eight; the turkey-hen is a steady sitter if left alone, but should only be used after laying her second batch of eggs. Testing can be done on the sixth day of incubation without difficulty, and is most necessary with the early batches. Should there be many infertile eggs it may be advisable to remove the stag and give him a plentiful supply of food stimulating in nature. The fertile eggs as a rule yield one hundred per cent. hatches, and they will frequently all be out of the shell by the twenty-eighth day.

REARING. Ground free from taint of poultry should be chosen for rearing, and the site changed each season. Large coops should be used with a run attached, which will afford some protection

INDIAN RUNNERS

A ROMAN GANDER

WHITE TURKEYS

from wind and rain. They ought to be moved daily on to a fresh spot.

No attempt should be made to feed the chicks until thirty-six hours after hatching, when fine grit placed on a clean board is first given.

Eggs prepared by scrambling as previously advised for chicken-rearing may be used with freshly scalded biscuit meal and fine sharps, provided at least an equal bulk of finely chopped young green food is given; dandelions and nettles are particularly valuable. The curds of sour milk may be given with advantage, and also cracked wheat and groats alternately with the wet food. Food should be supplied in very small quantities and no sour remnants allowed to collect.

After a fortnight, in favourable weather, the runs are better removed and the young birds allowed to roam; when six weeks old they will do better without the hen. At eight weeks of age turkeys are generally too large for coops and should be moved into houses and allowed to roost on boards raised eighteen inches from the floor.

While the young birds may be given all the food they will readily clear up, an excess of starchy foods must be avoided.

When once the birds have "shot the red," i.e., the wattles grow and the face reddens, they are considered to have passed the most delicate period and are better able to stand exposure. There is far more danger of colds and loss from keeping the young birds in close, stuffy houses at night than by allowing them to perch in the open, and although protection from rain and cold wind is needed fresh air is the foremost consideration.

All classes of poultry are intermittent feeders and this is particularly so with turkeys. Food need not be supplied constantly after the birds are three months old; it need only be given to supplement their gleanings. On a wide range conditions will be favourable for natural food at this season, and a moderate meal in the morning, mainly composed of middlings, with a good feed of grain at night will frequently prove sufficient, though an additional feed of grain scattered over the ground at midday may be needed.

Digestive troubles caused by faulty feeding are the chief cause of losses amongst young turkeys. It is the practice of some successful turkey-rearers to give a mild dose of Epsom-salt regularly once a week. This ought not to be necessary, but is often a useful corrective. Charcoal should be mixed up in the soft food.

FATTENING. The final process before killing for the Christmas markets need only cover a period of one month. It is a great mistake to shut the birds up to fatten; they will fret and refuse food after losing their liberty. The fact of giving extra food will induce them to take less exercise, and if left free they will range about close at hand.

At this period ground oats, maize meal, and barley meal may be freely supplied with middlings in a crumbly, moist condition. Grain can be steeped and meat offals boiled with wheat will be found to have a stimulating effect. This may be fed warm but not put before them until all steam has passed off, or the birds may refuse to go near it. Any change in food should be made gradually.

The demand on the markets is for quantity rather than quality of flesh, but if quality is desired ground oats are a far superior food for the purpose, with heavy oats as the grain food and separated milk for mixing. Charcoal is especially recommended for turkeys when fattening.

MARKETING. After a twenty-four hours' fast the bird should be killed by breaking its neck, unless the purchaser is likely to raise an objection to accepting them killed in this manner. Any objection is due to the added weight of the blood, which is paid for, since skilfully done this method of killing leaves the carcase in equally good condition for keeping and is far cleaner. When plucking, the feathers covering the hips should be left to protect the thin skin on the back from rubbing and bruising; the tougher wing-feathers are also frequently left on, but buyers prefer these removed, and this is more easily done when the body is hot.

The requirements of purchasers should always be studied.

DUCKS

The raising of table ducks upon a large scale has only proved a success in isolated cases. When eggs for hatching can be purchased, a considerable number can be reared profitably upon a limited area of ground, but to keep ducks of the larger varieties for breeding purposes throughout the year is only a practical proposition if these have ample range with a pond or a stream from which they can pick up much of their food.

Egg production is a different matter; birds of the smaller, more active breeds are kept, and these in some instances prove more profitable than laying pullets.

Duck-keeping for egg production is, however, only recommended when a reasonable amount of land is available for the birds to range over; for the garden poultry-keeper it can only be advised where he is prepared to let them run over his garden, and the number which can be kept is more limited than is the case with pullets.

BREEDS AND BREEDING. The heavier ducks (Aylesbury and Pekin) and the lighter breeds (Indian Runner and Buff Orpington) are the leading breeds and all that need be considered here.

For table qualities the *Aylesbury* is unequalled, but is a poor layer, inferior to the *Pekin* in this respect. A cross between the two is very suitable, and the ducklings will frequently weigh five pounds at eight to ten weeks old.

The *Runner Duck* is an extraordinarily good layer and will thrive without swimming water. Exceedingly good reports are also given of the *Buff Orpington*, which is larger and makes a better table bird.

From three to four ducks to a drake of the heavy breeds and five to six of the light breeds is the usual mating. The heavier ducks do not breed satisfactorily without swimming water, but this is not necessary for the smaller breeds.

HOUSING AND MANAGEMENT. It is a mistake to imagine that ducks need not have such dry and clean quarters as fowls. This is an important point. The floor of the duck-house is more satisfactory if a rack with slats one to one and a half inches apart is placed several inches above the whole of the floor for the ducks to rest upon. The straw litter placed upon it will keep clean and dry for a longer period and require less frequent renewal. A plentiful circulation of air is needed in the house, which should also be well lighted; this can of course be lower than for hens.

Unless a shed is used sufficiently roomy to permit the ducks being fed in it before they are released in the morning and when shut up in the evening, a feeding pen should be attached to the house. The ducks generally lay during the night or in early morning; in order to secure eggs which may otherwise be laid in the water or in stolen nests they should not be released before 10 a.m., and closed in the pen at the evening feed.

Cooked vegetables with bran and meals and some animal food, given morning and evening, are best for feeding stock ducks. Bulky food is required and grain not economical. If given at all, grain should be first steeped in cold water.

HATCHING. The duck is seldom used for sitting, the eggs being mostly placed under hens or in incubators. Nine or ten large eggs will prove a sufficient number for the average hen, although with the eggs of a Runner twelve may be given. It is most important to test these on the sixth day when under a hen, and again on the seventeenth day in an incubator. In the early part of the year the eggs may prove very infertile, and the second test is necessary to remove eggs containing dead and decaying embryos from the incubator drawer.

The difference in management between duck- and hen-eggs is in the temperature, which should be 1° lower in the incubator; and it is also considered necessary to supply the eggs with more moisture. These are damped with warm water after the hen has returned to the nest or immediately prior to returning the egg drawer. This procedure is commenced about the twelfth day until the twenty-fifth day of incubation. If hatching is not proceeding satisfactorily, on the twenty-ninth day the eggs may be placed in water heated to 103° for about thirty seconds and replaced immediately in the incubator. Assistance of this sort in hatching ought not be necessary.

REARING. Ducklings are particularly hardy and their mortality low. When reared for table the object is to bring them on rapidly, so that they may be fit to kill at eight or nine weeks old, before they commence to grow their second coat of feathers. It is necessary to produce a big frame during the first five weeks, and to feed for flesh after this. A good grass run and frequent feeding, with animal and green food included in the diet, will secure rapid growth if the young birds are given dry and clean quarters. For the concluding period the ducklings for killing should be given less liberty. A dry, roomy shed with a small yard attached into which the birds are only allowed for a short period at feeding time forms the best fattening quarters; but they will do better on an open grass run than in a damp and dirty yard.

Ducklings intended for stock will receive similar treatment during the first five weeks and continue on free range after this. These may be allowed access to swimming water with advantage in the second stage, but ducklings intended for market are unquestionably superior in quality of flesh if never allowed to swim.

The just-hatched ducklings require no food for twenty-four hours, when the very best start is to place a saucer of mud before them into which they will push their bills, sucking up the moisture and particles of gritty substance. After this, finely chopped green food with scalded biscuit meal is best for the first feeds.

Biscuit meals, rice (boiled), ground oats, and middlings are the main foods for the first stage, together with small quantities of meat or fish meal gradually increasing to fifteen per cent. of the whole. For fattening, middlings, barley meal, and maize meal, or ground oats with boiled rice form the best foods. Cooked meat offals may be given with these two or three times weekly. Green vegetables, given raw, are needed, but nettles should be boiled with the rice, particularly during warm weather. Boiled potatoes are a very good and often a most economical food for fattening.

MARKETING. If young ducks intended for market are not killed before the appearance of the new crop of feathers they will lose condition rapidly, and when killed give a great deal of extra trouble in preparation for sale. These new feathers usually begin to grow at ten or eleven weeks old; if the ducks are kept until these have finished growing the extra cost in feeding will greatly reduce the profits.

The most profitable trade is secured in the earlier months of the year in the large markets, although the markets serving seaside resorts are often good in the summer. The autumn and Christmas trade are not generally as profitable.

Killing and plucking should be speedily and cleanly done and only a few feathers left upon the last joints of the wings, the feet washed, and the bird when finished laid breast downwards upon a flat board until cold. Killing is best done by dislocation of the neck, though this is less easy than in the case of fowls.

EGG PRODUCTION. A flock of Runner ducks is most profitably kept in a paddock, an orchard, or on the farm, and need less attention than fowls. Ducks if at liberty will also thrive better on damp and cheerless positions than pullets. They are heavy layers and the eggs generally find a ready sale at the same price as hens' eggs, although they are larger. Ducks consume more food than fowls, and unless the food given is bulky in nature the margin of profit is small.

As a rule the duck lasts longer in profit than a hen, a larger percentage proving worth retention through a third laying season.

GEESE

Pure strains of geese are rare, the *Embden* (white goose) and the *Toulouse* (grey and larger) having been so freely crossed. These two breeds are almost the only varieties to be found on farms. From time to time other breeds, such as the *Russian, Chinese,* and *Roman* geese, have been introduced, and any revival in goose-breeding would receive valuable stimulation by the introduction of the Chinese goose, which is an exceedingly good layer, or the Roman goose, a particularly hardy bird of good size.

Farmers look upon geese differently: one section realizes the quantity of good grass they consume, while another considers they cost nothing to feed. It is true that if facilities are given them geese will find the majority of their food about the fields and ditches. Upon rough land they do much good and are very profitable. When kept upon good meadow-land it is only a question whether better use could be made of this for grazing cattle or sheep.

Geese are good gleaners on the stubble after harvest, and generally a source of profit on a farm, and where there are common rights over which to run the birds goose-rearing is profitably practised by cottagers.

The goslings are usually hatched by a hen which can cover four eggs; these do not hatch easily. It is frequently thirty days before the gosling is finally released and help from the shell is sometimes advisable. Goslings may be fed in a similar manner to ducklings, with an abundance of chopped green stuff; as in the case of turkeys, an excess of starchy foods often proves fatal. After a fortnight two, or sometimes three, light feeds daily will satisfy them, as they will subsist mainly upon grass.

The breeding stock do better with swimming water to keep them in hardy condition for reproduction. A gander for three or four geese is sufficient, and the birds will be of value for breeding six or seven years or even longer.

CHAPTER XII

POULTRY ON THE FARM

REFORM in poultry-keeping on the general farm is badly needed. Although considerable improvement is noticeable and there appears to be a genuine effort upon the part of many farmers to bring about a change for the better, these efforts are frequently misdirected and incomplete. The most notable improvement is in the stock kept, but upon many farms this is still of a very nondescript character, and the endeavours for betterment are carried out in a half-hearted manner. The introduction of pure bred cock-birds for the improvement of a mongrel bred flock is not sufficient in these days.

Surely the farmer can grasp the fact that there is a large and ever-growing demand for stock of pure strain by the small poultry-keepers, who are not in such a good position to breed and rear their own. He should also by this time have realized the great improvement which has taken place in the productive powers of certain breeds and strains of fowls, and even if it is a question of breeding table chickens with egg production as a secondary consideration, the advantage of breeding from only pure strains of one type and thus securing uniformity in the produce for market must appeal to the business man.

The best recommendation which can be made where these nondescript flocks exist is to make a clean sweep of them. With the introduction of a breeding pen of a dozen pure-bred birds of good utility strain the best of the young hens and pullets of the existing flock could be retained for laying and for hatching purposes until the fresh stock reared from this pen were ready to take their places in the following season.

Arrangements for housing poultry are for the most part very inferior on the farm. Many of the farm buildings used are most unsuitably placed and badly arranged. Attempts made for improvement by the purchase of small portable houses generally result in these being hopelessly overcrowded; usually at least three are needed where only one has been provided.

The most attractive thing to the farmer is an incubator, and although it is realized that a foster-mother is needed, the fact is quite overlooked that a second foster-mother and a batch of houses are probably also necessary for rearing the stock hatched by this incubator.

All this means an increased outlay of capital, in which direction the farmer is most difficult to move; but if he will only treat the matter as a business investment it will prove sound so long as no half measures are indulged in.

Labour is the most difficult problem of all, but unless poultry are looked upon as meriting some special and regular attention the best results from them must not be expected.

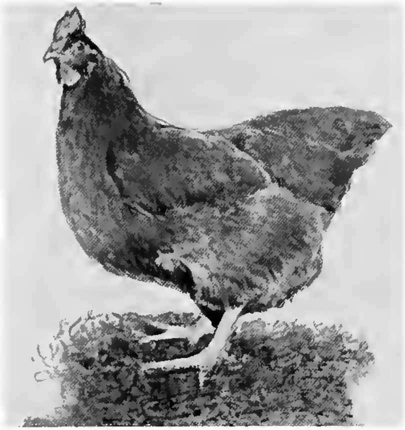
There is no reason why on large farms poultry-keeping should not be upon a sufficiently large scale to warrant the employment of a man or woman full time. Difficulties arise with wages as the work is incessant, while the hours are long and inclined to irregularity, but the work is skilled and should be paid accordingly. The poultryman, like a shepherd or gamekeeper, must be a trustworthy person.

Payment partly upon results appears to be the best solution for poultry-workers as it is in many other directions.

With farm poultry-keeping upon the ordinary scale recommended in the following pages the farmer can best solve the difficulty of labour by handing over care of the poultry to a son or a daughter, if so fortunately placed. In this event entire responsibility should be given and a chief interest in the results allowed by way of payment. The necessary capital should be found and interest on this deducted before the profits are calculated. The farmer's share may merely be the provision of eggs and poultry for home consumption, but it is a better plan to keep account of these and show them in the accounts at market rates; products of the farm and any extra labour should be chargeable to the poultry.

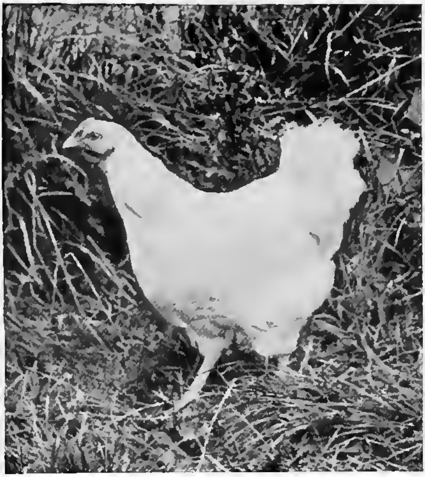
If carried out on these lines and a strict account kept by the individual responsible, the interest and education in business methods thus secured will result in general benefit. The poultry work, while not necessarily engaging all the time of the son, should be looked upon as a first duty.

Failing the advantage of a member of the family taking the necessary interest, the services of a boy just leaving school have often proved most satisfactory. It goes without saying that some boys are not adaptable to poultry-work, and that super-



RHODE ISLAND RED PULLET

A HEAVY LAYER. BRED BY W. M. GOLDEN



WHITE WYANDOTTE (UTILITY TYPE)

A HEAVY LAYER. BRED BY W. BRADBURY

vision is necessary, but the main regular duties can quite easily be carried out by a boy even if the most skilful part of the work, i.e., chicken-rearing, has to be undertaken by more responsible hands.

A system for adoption upon the farm is outlined which it is considered will be suitable for the majority of general farms carrying out poultry-keeping upon an ordinary scale.

THE STOCK. One breed only should be kept. This is usually best selected for the general purpose of egg production and table poultry, and unless an incubator is to be used a sitting variety should be chosen, but specialization in one or other direction is advised, and for choice the White Wyandotte or Rhode Island Red for egg production, or the light Sussex for table chickens.

With the main object egg production, a hundred pullets should be kept for laying, and twenty-four hens with two cocks for breeding purposes. For table chickens, when the rearing of larger numbers will be necessary to secure an equal profit, it will be better to retain a larger proportion of hens with additional cockerels for breeding.

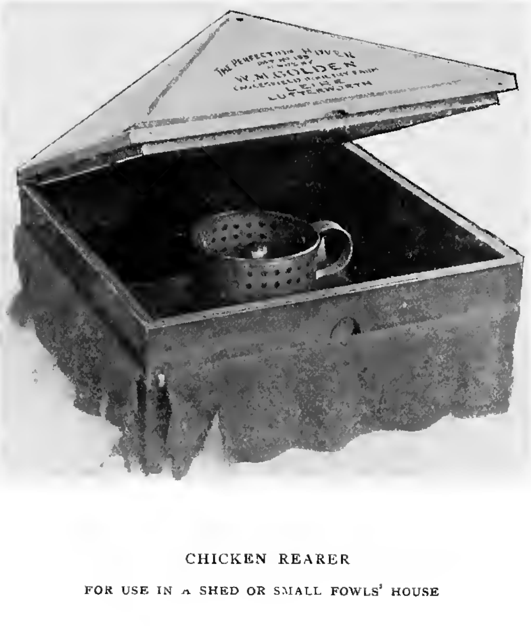
Cockerels for breeding should either be purchased annually from a fresh strain, or raised from purchased sittings, the chickens from these being carefully marked for identification. All the stock should be marked with coloured rings to denote the year of hatching.

HATCHING AND REARING. From two to three hundred chickens will be reared annually. To simplify the work these should be hatched and raised in batches, when the young birds can be brought on according to their respective ages. With the use of an incubator this would follow more naturally, but if hens only are used these should be set in batches of eight, allowing the broody hens to wait until the requisite number could be gathered and set at one time.

The first batch of eggs must be set in mid-February, the second in March, and a third in April; hatching will then be over by the middle of May. Odd batches of chickens are troublesome, and before attempting to hatch more than the number already indicated, an addition to the equipment outlined would have to be made. Late chickens are less profitable and hatching after May cannot be generally advised.

EQUIPMENT. The hundred pullets can be kept in one, two, or three batches, and the hens in flocks of twelve with a cock. Provision must be made of a laying house, or houses, for the pullets, which should not be mated. The houses should be of the scratching shed type and located in a sheltered position, either in an orchard, the stack-yard, or a paddock, near the farm-house. The range of these birds should be restricted by the erection of a large pen, or by wiring round the paddock or orchard.

The twenty-four hens for breeding will be placed in two portable houses, six feet by four feet in size, kept out in the meadows with a free range. An incubator or eight sitting-boxes for hatching, and two adaptable hovers or eight coops for rearing the young chicks will be needed. Four additional portable houses should be provided into which the young birds can be drafted from coops; the hovers will be used in these and prove more economical than foster-mothers. Wooden feeding-troughs and suitable water-vessels must not be omitted from the equipment.



CHICKEN REARER

FOR USE IN A SHED OR SMALL FOWLS' HOUSE

General Management. Every advantage should be taken of the ample range afforded on the farm, as this will secure a considerable reduction in the annual food bill. The limited number of breeding stock can usually be allowed free range without risk of harm to any crops. The chickens will be small and incapable of much damage before the hay is cut, and the pullets will be kept under control from October to June or later.

Following haymaking and harvest the entire stock, so far as housing accommodation permits, should be out in the fields; rough shelters can be put up in corners of fields for additional accommodation in the summer. The young birds will often do better roosting in the hedges with only netting as a protection against foxes. The run occupied by pullets should be freed for at least a short period in the latter part of the summer before the new batch of pullets are drafted in; the laying-house should then have a thorough cleaning.

The pullets will be brought into the laying-house at the end of September, the hens and young cockerels remaining in the fields both to glean on the stubbles and to follow the plough. The majority of the young cockerels will already have been marketed, and the remainder should follow as soon as fit, only a few special birds being retained for stock purposes.

The past season's breeding hens, by now over two years old, can be sold off in September, or earlier, to make room, and culling of the previous season's pullets be proceeded with to reduce the numbers to the necessary proportions before winter sets in. These may at times find a sale alive for stock purposes, or since pullets fetch high prices in comparison, the best of the young hens may be reserved for the laying-house and some of the pullets sold. The reduction of the stock to definite limits and the rigid culling of the birds in September and October are most important items in management.

FEEDING. In spite of repetition it is necessary to call attention again here to the need of the birds in winter for animal and vegetable food. The farmer is particularly averse to buying food for the hens, preferring to use his own produce. Practically all that he need go outside his own farm to secure is meat food, and when insect life is scarce or the birds penned a supply of this is essential for the best results; fish or meat meal is commended to his use. He has one alternative, separated or buttermilk, which is as valuable for his hens as his pigs, but except in remote districts it is seldom available in these days.

TURKEYS, DUCKS, AND GEESE. One or other of these classes may be made a special feature of the poultry-keeping operations, but they should never be run together: it complicates management and spoils the results. Selection is governed by the prevailing conditions. Turkeys are particularly profitable, but geese and ducks require less attention. A limited number of hens selected for good laying and sitting propensities should be kept in conjunction with one or other.

Before concluding this chapter, it may be stated that the writer's experiences with poultry-keeping on general farms has been of a most successful character. The benefit to the grass from occupation by the poultry, and to the crops in freeing the land from such pests as wire-worms, and the roots during caterpillar plagues, have been continually noted, and while personally a poultry-keeper first, and therefore open to a charge of bias, confirmation and direct evidence of these claims have frequently been given to me by farmers.

The statement that cattle will not feed where poultry are running can only arise where these are so thickly kept that the land is soured, and actual evidence of this has never come to my notice.

CHAPTER XIII

COMMON DISEASES

POULTRY-KEEPERS should concentrate their efforts more on the prevention of sickness amongst the birds than on curing it. However, with the most careful management troubles will arise and the poultry-keeper should have some knowledge of the symptoms and treatment of the commoner ailments. Although lack of experience in poultry management is mainly responsible for outbreaks of sickness, these are very frequently the result of carelessness, and many experienced poultry-keepers are to be severely blamed for lax and unpractised methods, which bring trouble upon themselves and those to whom they supply stock.

The fowl has not usually been deemed of sufficient value to justify individual treatment. Probably in the large majority of cases this is the correct view to take, but, as a result of it, far less knowledge has been gained of the causes and treatment of the various ailments affecting poultry. The most skilful poultry-doctor is usually the fancier, whose bird may be worth many pounds for the show-pen, and so justifies considerable trouble in effecting a cure, although for breeding purposes it may be of no further use. From the point of view of the utility poultry-breeder a bird which has suffered from any serious illness must be considered of no further value, or even a positive danger for breeding. After an illness the value of a hen for productive purposes, if not lost, is greatly reduced, and a treatment that is long and troublesome is not worth while.

The knowledge of disease which is needed is therefore confined to early diagnosis, preventive measures and such general simple treatment as will facilitate the recovery of birds suffering from any mild attack.

CAUSES AND PREVENTION

Breeding. To what extent, if any, recovery from certain diseases will produce either immunity from, or, on the other hand, predisposition to, the disease in the progeny of the affected bird is quite unknown. In the present state of knowledge the risk of introducing such birds into the breeding pen should never be taken.

Certain physical weaknesses appear to descend from one generation to another and, although no evil results from such inheritance may be apparent for some time, it must not be forgotten that a tainted stock under adverse conditions will be very susceptible to disease. With the increased strain of higher production and the more artificial conditions under which birds are kept, we must be prepared to face some reduction in constitutional vigour, and only by the most rigid selection of the breeding stock can that stamina necessary for the resistance of disease be maintained.

Hygiene. Cleanliness in all things is an essential condition in the poultry-yard, and begins with the removal of excreta from contact with anything by which they could again enter the fowl's system. Clean food- and water-vessels, clean litter and perches, disinfection of houses and runs, are all needed to minimize the risk from disease. Infection may spread rapidly amongst the flock by contamination of the food and water. Body parasites affect the bird's powers of resistance, probably act as "carriers" of disease, and very often cause suffering sufficient to be followed by losses in production The foul gases arising from unclean surroundings are probably the chief means of bringing about "roup," which is the greatest trouble of all to be contended with.

FEEDING. The active bird kept away from its natural food will eat anything available, however unsuitable, and to harmful excess, in its endeavour to satisfy its bodily cravings. The almost certain result of this is digestive trouble, generally covered by the term "Liver Disease." Fortunately, as the main principles of feeding have become better known, liver disease has become less common in well-kept flocks, although it is still a great source of trouble amongst the farmers' fowls. Thousands of chickens die annually from digestive disorders, and some proportion of this loss may be put down to injurious ingredients in proprietory foods.

PURCHASED STOCK. The warning against the risk involved in the purchase of stock from infected yards requires constant repetition. It is not always possible to inspect a breeder's methods, so birds arriving from another yard should always be isolated before being put with the flock. In addition, stock may be perfectly healthy when dispatched, and either contract disease on the journey or become so affected by new conditions that disease which was otherwise dormant may develop. The ill effects of a journey will be aggravated if the bird is isolated in uncomfortable quarters.

New stock should always be carefully examined on arrival for physical defects. A crooked breast, a roach back (unevenness of the hip bones), and twisted toes indicate constitutional weakness. Signs of roup or cold are a discharge from the nostrils on pressing, or from the eyes, and inflammation of these. The condition of the shoulder-feathers will often show if the bird has been rubbing its head against these to allay irritation. Close scrutiny of the mouth and tongue may reveal the fungus growth of roup, which is visible in whitish-yellow patches. "Carriers" of roup often exhibit only very slight symptoms, and so are extremely dangerous. Probably the surest way of detecting carriers is by the smell of their breath, which is very offensive. A look-out for scaly leg and body parasites should also be kept.

An isolation period of seven days will give opportunity for observation of purchased birds and the development of disease; any in which defects are found should be returned to the seller before the term of approval, usually only three days, has expired. The return of the empty hamper should only be delayed this period.

COMMON COMPLAINTS

It is only intended to deal briefly with the symptoms and simple treatment of such diseases as have been met with and successfully treated by the writer. For a proper study of the subject the reader is recommended to "Diseases of Poultry," by Pearl, Mayne, and Curtis. The segregation of badly affected birds, together with cleanliness, comfortable housing, and judicious feeding, are the necessary preliminaries in every case of sickness. The sick bird should under no circumstances be kept in a coop on the bare ground.

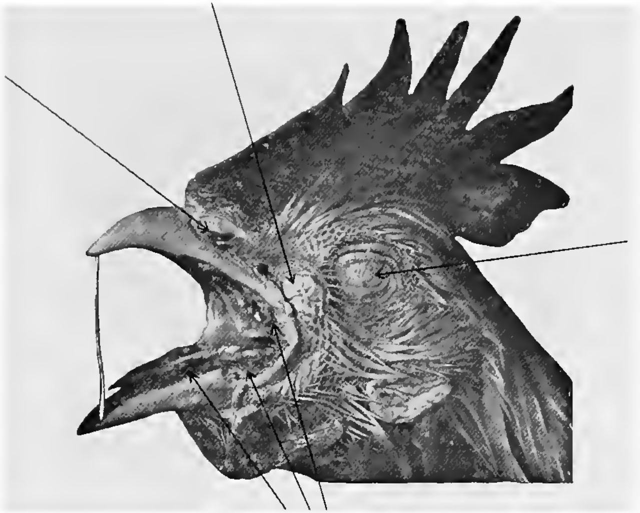
ROUP. *Symptoms.* Discharge from the nostrils and eyes, soft swellings round the eyes and face, and offensive breath.

Treatment. The entire flock in the infected house should be given a small dose of Epsom-salt and a small quantity of condition powder in their food. Sulphate of iron in the proportion of one ounce to ten gallons of water should be dissolved in the drinking water. This should never be placed in a zinc vessel. Bad cases should be removed, and the face and nostrils swabbed with hot water to which a little tincture of iodine has been added. A very weak solution of this may also be used as a spray in the mouth and nostrils, but glycerine and thymol are even better for this purpose.

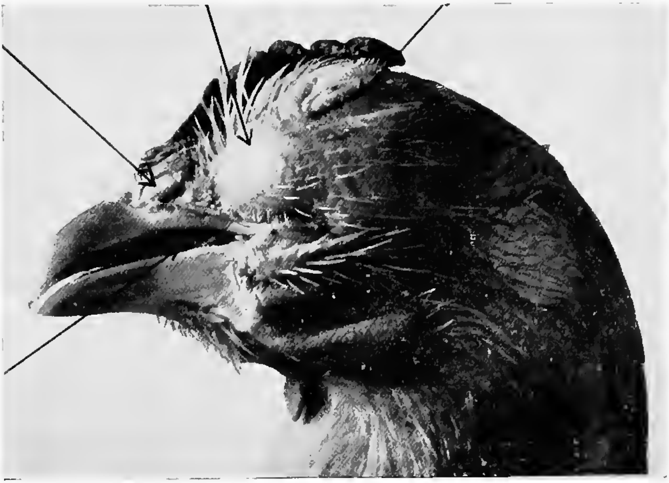
AVIAN DIPHTHERIA. *Symptoms.* This is similar to roup, in a much worse form. Cheesy matter exudes from the eyes and growths form round the eyes and nostrils and in the mouth.

Treatment. The better plan is to kill the bird and burn at least the head parts. Treatment, if undertaken at all, is the same as that for roup; a stronger solution of iodine may be used for painting the affected parts, and this may be applied to the spots in the mouth with a pointed match-stick.

LIVER DISEASE. For present purposes all the varieties of liver trouble are classed together. Acute


Nostril nearly closed
Eye watery and beginning to close
Fibrinous masses over tongue and mouth

DIPHTHERITIC ROUP


Tumour
Eye displaced and closed by swollen membranes
Nostril sealed by cheesy growth
Mouth filled with fibrinous exudate

TUMOUR CAUSED BY ROUP

forms of liver diseases are incurable, but milder forms, such as jaundice, can be successfully treated.

Symptoms. Dullness in the eyes and in the plumage, which becomes rough, and discoloration of the comb and face, which may either turn dark or assume a yellowish tinge. The lighter colour is less alarming. The evacuations are loose and yellow in colour. The bird may die rapidly, and post-mortem examination shows the liver unhealthy and patchy in appearance, possibly enlarged, and frequently very soft and falling to pieces.

Treatment. Small regular doses of salts and light feeding with plenty of green food. The leaves of dandelions freshly chopped, or the roots dried and steeped in water and mixed with meal, is a good remedy for jaundice. Scratching should always be encouraged in cases of liver trouble and the greatest care taken in disinfecting.

WORMS. Tape- and round-worms in fowls are not at all uncommon, and the mortality amongst chickens infected with round-worms is sometimes heavy. The ground becomes tainted, and in cases of epidemic nature, heavy dressings of basic slag should be used and the ground freed from poultry for a considerable period.

Symptoms. Emaciation and anæmia even when the birds are well fed. The "going light" often attributed to liver disease or other causes may be nothing more than worms.

Treatment. Santonine is given dissolved in the water used for mixing the soft food, at the rate of two grains per adult bird.

COCCIDIOSIS. This is caused by an intestinal parasite, and likely to spread through the entire flock. Like roup, the disease may be introduced through purchased birds, but its detection is difficult until it has reached an advanced stage. Coccidiosis is most common amongst chickens, which are attacked at the earliest stages, and Leghorn chickens appear particularly susceptible. Very bad epidemics have been experienced with adult fowls, which in spite of greater powers of resistance will die off in large numbers if not treated. Birds that recover may be kept for production but should not be bred from.

Symptoms. Gradual or rapid wasting, diarrhœa, excessive hunger and thirst. Little chicks scour and rapidly lose strength, their wings drooping on the ground, and the heads looking long and bony. The bird dies from lack of nourishment, the presence of parasite in the digestive tract interfering with the assimilation of the food.

In badly infected birds post-mortem examination reveals round whitish spots on the spleen and liver, but actual identification of the parasite is only possible by microscopical examination.

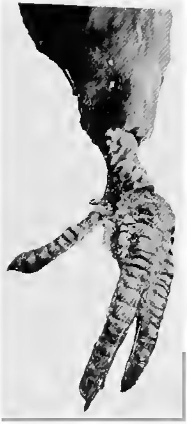
Treatment. A solution of powdered catechu in water added to the drinking water at the rate of one ounce of catechu in twenty-eight gallons of water. This should be used in all the water for a period of ten days.

FAVUS. This is a form of eczema, is infectious, and most unsightly.

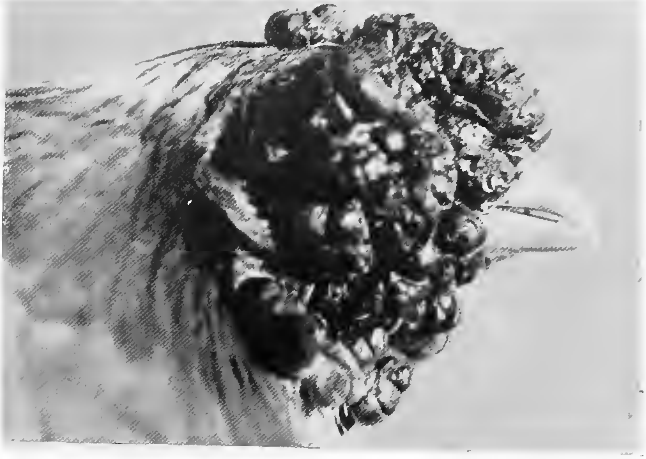
Symptoms. White patches form on the comb and face, sometimes spreading down the neck.

Treatment. Carbolized vaseline should be applied to the affected parts.

CHICKEN POX (Contagious Epithelioma). This does not appear to be very prevalent, and was only seen by the writer a few years ago for the first time.



SCALY LEG IN AN ADVANCED STAGE



CONTAGIOUS EPITHELIOMA

Symptoms. The spots, occurring chiefly on the comb and wattles, are defined in shape and of yellowish tinge.

Treatment. The epidemic experienced only resulted in loss of production, and no treatment, other than ordinary care, cleanliness, good feeding, and avoidance of chill, was followed. Nevertheless heavy losses have been reported from this disease, and the greatest care should be taken to isolate individuals affected and the flock in which the outbreak occurs.

SCALY LEG. This is caused by a parasite which lodges under the scales of the leg, and is found mostly in the older birds. When once introduced into a flock this may be expected to recur periodically unless proper steps are taken to get rid of it. Although the bird may be only slightly affected in the early stages, the mites multiply rapidly and the legs become very painful and unsightly. The poultry-keeper should consider it a disgrace to have this disease in his yards.

Symptoms. The scales are raised and form in masses instead of fitting closely to the leg.

Treatment. Dip the leg in paraffin oil, and afterwards scrub with soft soap and warm water, using a soft brush. This will cure mild cases. Bad ones should be killed. Thorough disinfection of perches and floors is necessary, care being taken to see that infection is not spread by contaminated litter.

INSECT PESTS. *Body Lice.* The method of treatment for body lice has already been indicated. Of all insecticides, flowers of sulphur appears to be the most effective. This should be well dusted over the skin and feathers of the bird, particularly over the fluffy parts near the vent, and beneath the wings. *Feather Lice* are dealt with in the same way, but badly infected birds should be washed with disinfectant soap.

MITES AND TICKS. These differ from insects in possessing four instead of three pairs of legs.

Red Mite. These creatures are no bigger than a pin-head, and are at first grey, but turn red after sucking blood. They are seldom to be found on the birds except at night, when they gorge on blood and drop down to hide in crevices in the house, breeding rapidly. They repeat the raids on nesting and perching birds nightly. The effect on the fowls is serious, and no time should be lost in stamping the mites out. Every part of the house, especially the perch rests, should be treated with creosote, which is much superior to paraffin for the purpose.

Ticks. These are to be found both on adult birds and on young chicks, the latter suffering more seriously. The ticks fasten themselves into the skin chiefly on the head, neck, and throat, and give the appearance of stubs of feathers in process of formation.

Paraffin diluted with three times its volume of hot water and applied twice, with an interval of two days between the applications, is usually an effective remedy. A disinfectant ointment may be used as an alternative.

GAPES. This is still a dreadful scourge of farm chickens and appears to be more prevalent amongst these than the better attended birds of the specialist poultry-keeper. The source of infection is hard to trace. In the single outbreak the writer had among his own flock, infection was brought in with some purchased birds. Gapes is caused by worms which multiply in the windpipe, and will choke the chicken unless it can cough them up.

Symptoms. The chicks sneeze or cough and gasp for breath, the " gaping " is indicated by the name of the disease.

Treatment. The aim is to fumigate the chicks, thus loosening the hold of the worms and compelling the chick to cough them up. Good gape powders such as Blackerite or Gamlin are simple and safe. The powder is spread over the floor of a box in which the chickens are confined, and then blown about by means of bellows. This treatment should not be carried out in the coop or where the worms expelled may again infect the chicks or others. Chopped raw onion mixed with the soft food is of great benefit to slightly affected chicks.

In concluding these brief notes it is recommended that expert advice should be obtained on the appearance of anything approaching a serious epidemic, and if advice is sought by correspondence a post-mortem should be made and any abnormal appearance described as far as possible.

The bodies of all birds that die should be burnt, and great care taken to see that the attendants do not spread infection on their hands, clothes, and boots when there is any sickness among the fowls.

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